Management Software

Layer 2-4 Gigabit Ethernet EcoSwitches

AT-9000/28
AT-9000/28SP
AT-9000/52

Web Browser User's Guide

AlliedWare Plus Version 2.1.2

613-001443 Rev A

Allied Telesis™

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3200 North First Street
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Contents

Preface 11
Document Conventions 12
Downloading Management Software and Web-based Guides 13
Contacting Allied Telesis 14
Online Support 14
Email and Telephone Support 14
Returning Products 14
Sales or Corporate Information 14
Management Software Updates 14

Chapter 1: AlliedWare Plus™ Version 2.1.2 Web Browser Interface 15
Management Sessions 16
Web Manager Accounts 17

Chapter 2: Starting a Management Session 19
Starting a Web Management Session 20
Selecting items from a Web Page 26
What to Configure First 27
Assigning a Name to the Switch 27
Adding a Management IP Address 27
Setting System Time 27
Saving Your Changes 28
Ending a Web Management Session 29

Chapter 3: Basic Switch Parameters 31
Setting the System Date and Time 32
Setting System Time Manually 33
Setting An SNTP or NTP Server 35
Setting a Telnet or SSH Server 38
Setting a Remote Log Server 40
Setting the Switch Information 41
Setting the Configuration File 43
Displaying and Setting the Active Configuration File 43
Uploading a Configuration File 44
Managing User Accounts 45
Adding a User 45
Changing a User Password 46
Changing the User Privilege 48
Deleting a User 49
Rebooting a Switch 50
Upgrading the Software 51
Returning the AlliedWare Plus Management Software to the Factory Default Values 53
Displaying System Information 54

Chapter 4: Setting Port Parameters 57
Displaying the Port Parameters 58
Changing the Port Settings 62

Displaying the Storm Control Settings 66
Modifying the Storm Control Settings 68

Chapter 5: Setting Port Statistics 71
Displaying Port Statistics 72
Displaying Transmit and Receive Port Statistics 72
Displaying the Receive Statistics 73
Displaying Transmit Statistics 75
Displaying Interface Statistics 77
Clearing Port Statistics 79

Chapter 6: Setting Port Mirroring 81
Overview 82
Displaying Port Mirroring Settings 83
Assigning a Destination Port 85
Assigning Port Mirroring Values 86

Chapter 7: Setting the Port Spanning Tree Protocol 89
Overview 90
Displaying Port Spanning Tree Protocol Settings 91
Modifying Port Spanning Tree Protocol Settings 93

Chapter 8: Setting the MAC Address 95
Displaying the MAC Address 96
Displaying the Unicast MAC Addresses 96
Displaying Multicast Addresses 97
Assigning a MAC Address 99
Assigning an Unicast Address 99
Assigning a Multicast Address 100
Deleting a MAC Address 102
Deleting a Unicast Address 102
Deleting a Multicast Address 102

Chapter 9: Setting LACP 105
Overview 106
Displaying LACP Trunks 107
Adding an LACP Trunk 109
Modifying an LACP Trunk 111
Deleting an LACP Trunk 113

Chapter 10: Setting Static Port Trunks 115
Overview 116
Displaying Static Trunk Settings 117
Adding Static Trunks 119
Modifying the Static Trunk Settings 122
Deleting Static Trunks 125

Chapter 11: Setting Port-based and Tagged VLANs 127
Overview 128
Port-based VLANs 128
Tagged VLANs 128
Tagged and Untagged Ports 129
Displaying VLANs 130
Adding an VLAN 132
Modifying VLANs 134
Deleting VLANs 136

Chapter 12: Setting Switch Spanning Tree Protocols 137
Overview 138
Displaying Switch Spanning Tree Protocol Settings 139
Modifying Switch Spanning Tree Protocol Settings 142

Chapter 13: Setting Internet Group Management Protocol (IGMP) Snooping 145
Overview 146
Displaying and Modifying IGMP Snooping Configuration 147
Clearing the Routers List 149
Disabling IGMP Snooping 151
Displaying the Routers List 152
Displaying the Hosts List 153

Chapter 14: Setting MAC Address-based Port Security 155
Overview 156
Static Versus Dynamic Addresses 156
Intrusion Actions 156
Guidelines 157
Displaying the MAC Address-based Port Security Settings 158
Modifying the MAC Address-based Port Security Settings 160
Disabling MAC Address-based Port Security Settings 162

Chapter 15: Setting RADIUS and TACACS+ Clients 163
Overview 164
Remote Manager Accounts 164
Configuring TACACS+ and RADIUS 165
Selecting the Authentication Method 166
Configuring the Authentication Server 168
Configuring a TACACS+ Server 168
Configuring a RADIUS Server 170
Deleting an Authentication Server 173

Chapter 16: Setting 802.1x Port-based Network Access 175
Overview 176
Enabling 802.1x Port-based Authentication on the Switch 177
Configuring 802.1x Port-based Authentication 178
Displaying the 802.1x Authentication Port Settings 183
Disabling 802.1x Port-based Authentication on the Switch 184
Disabling 802.1x Port-based Authentication on a Port 185

Chapter 17: Setting IPv4 and IPv6 Management 187
Overview 188
IP Management Guidelines 189
Assigning an IPv4 Address 190
Assigning a Static IPv4 Address 190
Assigning an DHCP IPv4 Address 192
Assigning an IPv6 Address 194
Displaying IP Addresses 196
Deleting IP Addresses 197
Deleting an IPv4 Static Address 197
Deleting an DHCP IPv4 Address 197
Deleting an IPv6 Address 198

Chapter 18: Setting LLDP and LLDP-MED 199
Overview 200
Setting LLDP Locations 201
Creating a Civic Location 201
Creating a Coordinate Location 205

Creating an ELIN Location 207
Configuring LLDP and LLDP-MED 210
Setting the Basic LLDP Configuration 210
Setting LLDP Port Assignments 212
Assigning Port Locations 214
Enabling LLDP TLV 216
Enabling LLDP- MED TLV 220
Displaying LLDP Neighbor Information 223
Displaying LLDP Statistics 225
Displaying LLDP Locations 228
Displaying Civic Locations 228
Displaying Coordinate Locations 229
Displaying ELIN Locations 230
Displaying LLDP and LLDP-MED Settings 232
Displaying the Basic LLDP Configuration 232
Displaying LLDP Port Assignments 233
Displaying Port Locations 234
Displaying LLDP TLV 234
Displaying LLDP-MED TLV 236
Disabling LLDP on the Switch 238

Chapter 19: Setting sFlow 239
Overview 240
Ingress Packet Samples 240
Packet Counters 240
sFlow Collectors 241
Guidelines 241
Enabling sFlow on the Switch 242
Configuring sFlow on a Port 243
Specifying an sFlow Collector 245
Displaying the sFlow Settings 247

Figures

Figure 1: Login Menu 20
Figure 2: Displaying the IP address 21
Figure 3: Login Page 22
Figure 4: Dashboard Page 23
Figure 5: System Contact Information Page 28
Figure 6: System Settings Tab 33
Figure 7: System Time Settings Page 34
Figure 8: Calendar Page 35
Figure 9: System Time Settings Page with Network Time Settings Tab 36
Figure 10: System Services Page 39
Figure 11: System Contact Information Page 41
Figure 12: Configuration Files Page 43
Figure 13: File Upload Page 44
Figure 14: User Management Page 45
Figure 15: User Management Page with Change Password Tab 47
Figure 16: User Management Page with Change Privilege Tab 48
Figure 17: User Management Page with Delete User Tab 49
Figure 18: System Upgrade Page 52
Figure 19: Switching Tab with Port Tab 58
Figure 20: Port Configuration Page 59
Figure 21: Port Configuration Modify Page 63
Figure 22: Storm Control List Page 66
Figure 23: Storm Control Settings Page 68
Figure 24: Port Statistics Page with Tx + Rx Tab 72
Figure 25: Port Statistics with the Receive Tab 74
Figure 26: Port Statistics with the Transmit Tab 76
Figure 27: Port Statistics Page with Interface Tab 77
Figure 28: Port Mirroring List Page 83
Figure 29: Modify Port Mirroring Page 86
Figure 30: Port Spanning Tree Settings Page 91
Figure 31: Modify Port Spanning Tree Settings Page 93
Figure 32: Switching Tab 96
Figure 33: Unicast MACs Page 97
Figure 34: Multicast MACs Page 98
Figure 35: Unicast MAC Page 99
Figure 36: Multicast Mac Address Page 100
Figure 37: Switching Tab with Link Aggregation Selected 107
Figure 38: LACP Trunks Page 107
Figure 39: Add LACP Trunk Page 109
Figure 40: Modify LACP Trunk Page 111
Figure 41: Switching Tab with Static Trunks 117
Figure 42: Static Trunks Page 117
Figure 43: Add Static Trunk Page 120
Figure 44: Modify Static Trunk Page 123
Figure 45: VLANs Page 130
Figure 46: Add VLAN Page 132
Figure 47: Modify VLAN Page 134
Figure 48: Spanning Tree Settings Page 139
Figure 49: IGMP Snooping Page with Configuration Tab 147
Figure 50: IGMP Snooping Page with Routers List Tab 149

Figure 51: IGMP Snooping Page with Hosts List Tab....153
Figure 52: Security Tab....158
Figure 53: MAC Based Port Security Page....158
Figure 54: Modify MAC Based Port Security Page....160
Figure 55: Authentication Server Configuration Page with TACACS+ Tab....166
Figure 56: Tacacs Add Page....169
Figure 57: Authentication Server Configuration Page with Radius Tab....170
Figure 58: Radius Server Configuration Page....171
Figure 59: 802.1x Authentication Page....177
Figure 60: Modify 802.1x Authentication Page....178
Figure 61: Modify 802.1x Authentication Page Expanded....179
Figure 62: 802.1x View Page....183
Figure 63: 802.1x Authentication Page with Status Enabled....184
Figure 64: Management Tab....190
Figure 65: IP Management Configuration Page with Static IP Address....191
Figure 66: IP Management Configuration Page with DHCP....193
Figure 67: IPv6 Management Configuration Page....194
Figure 68: Discovery & Monitoring Tab....201
Figure 69: Locations Tab....202
Figure 70: LLDP Civic Location Page....202
Figure 71: LLDP Civic Location Page— Modify....204
Figure 72: LLDP Coordinate Location Page....205
Figure 73: LLDP Coordinate Location Page— Modify....206
Figure 74: LLDP ELIN Location List Page....208
Figure 75: LLDP ELIN Location Page....208
Figure 76: LLDP Configuration Page....211
Figure 77: LLDP Port Config Page....213
Figure 78: Modify LLDP Port Configuration Page....214
Figure 79: LLDP Port Location Page....215
Figure 80: Modify LLDP Port Location Page....216
Figure 81: LLDP TLV Tab....217
Figure 82: LLDP TLV Page....217
Figure 83: Modify LLDP TLV Page....218
Figure 84: LLDP MED TLV Page....220
Figure 85: Modify LLDP Med TLV Page....221
Figure 86: LLDP Neighbors Information Page....223
Figure 87: LLDP Statistics Page with Port Statistics Tab....225
Figure 88: LLDP Statistics Page with Summary Tab....226
Figure 89: sFlow Page with the Port Configurations Tab....242
Figure 90: sFlow Port Modify Page....243
Figure 91: Sflow Page with Collectors Tab....245
Figure 92: Sflow Collector Page....246

Preface

This is the web browser management guide for the AT-9000/28, AT-9000/28SP, and AT-9000/52 Managed Layer 2-4 Gigabit Ethernet EcoSwitches. The instructions in this guide explain how to start a management session, use the web interface of the AlliedWare Plus™ Management Software, and configure the features of the switch.

For hardware installation instructions, refer to the *AT-9000 Manager Layer 2 GB EcoSwitch Series Installation Guide*.

This preface contains the following sections:

- ❒ “Document Conventions” on page 12
- ❒ “Downloading Management Software and Web-based Guides” on page 13
- ❒ “Contacting Allied Telesis” on page 14

Caution

The software described in this documentation contains certain cryptographic functionality and its export is restricted by U.S. law. As of this writing, it has been submitted for review as a “retail encryption item” in accordance with the Export Administration Regulations, 15 C.F.R. Part 730-772, promulgated by the U.S. Department of Commerce, and conditionally may be exported in accordance with the pertinent terms of License Exception ENC (described in 15 C.F.R. Part 740.17). In no case may it be exported to Cuba, Iran, Iraq, Libya, North Korea, Sudan, or Syria. If you wish to transfer this software outside the United States or Canada, please contact your local Allied Telesis sales representative for current information on this product’s export status.

Document Conventions

This document uses the following conventions:

Note
Notes provide additional information.

Caution
Cautions inform you that performing or omitting a specific action may result in equipment damage or loss of data.

Warning
Warnings inform you that performing or omitting a specific action may result in bodily injury.

Downloading Management Software and Web-based Guides

Both new releases of management software and product documentation are available from the Allied Telesis web sites. The management software is available at **www.alliedtelesis.com/support/software**. To display all of the network management software for a product, use the pull-down menu labeled "All" to select a hardware product model such as "AT-9000/28SP." Then double click the software version that you want to download onto your local work station or server.

The installation and user guides for all Allied Telesis products are available in PDF at **www.alliedtelesis.com/support/documentation/**. To display all of the product documentation for a product, use the pull-down menu labeled "All" to select a hardware product model such as "AT-9000/52." Then double click the document that you want to view. You can view the documents online or download them onto your local workstation or server.

Contacting Allied Telesis

This section provides Allied Telesis contact information for technical support and for sales and corporate information.

Online Support

You can request technical support online by accessing the Allied Telesis Knowledge Base: **www.alliedtelesis.com/support/kb.aspx**. You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

Email and Telephone Support

For Technical Support via email or telephone, refer to the Allied Telesis web site at **www.alliedtelesis.com**. Select your country from the list on the web site and then select the appropriate tab.

Returning Products

Products for return or repair must first be assigned a return materials authorization (RMA) number. A product sent to Allied Telesis without an RMA number will be returned to the sender at the sender's expense. For instructions on how to obtain an RMA number, go to our web site at **www.alliedtelesis.com** and then select Support and Replacement Services.

Sales or Corporate Information

You can contact Allied Telesis for sales or corporate information through our web site at **www.alliedtelesis.com**.

Management Software Updates

New releases of the management software for our managed products are available from the Allied Telesis web site: **www.alliedtelesis.com**. For downloading instructions, see "Downloading Management Software and Web-based Guides" on page 13**.**

Chapter 1

AlliedWare Plus™ Version 2.1.2 Web Browser Interface

This chapter describes the types of web management sessions on the AlliedWare Plus web interface and the web interface manager accounts. See the following sections:

- “Management Sessions” on page 16
- “Web Manager Accounts” on page 17

Management Sessions

This manual provides procedures that guide you through the AlliedWare Plus Web interface. The AlliedWare Plus Management Software supports the AT-9000/28, AT-9000/28SP, and the AT-9000/52 Layer 2-4 Gigabit Ethernet EcoSwitches in both the web interface and the Command Line Interface (CLI).

The initial management session of the switch must be from a local (serial port console) management session because you must assign the switch an IP address from a local session. After you have assigned an IP address to the switch and enabled web management, you can log onto the web with either an encrypted (HTTPS) or a non-encrypted (HTTP) web browser management session.

In addition, the web interface allows access to a subset of the AlliedWare Plus features. For access to all of the AlliedWare Plus features, you must use the CLI.

Detailed feature descriptions are not provided in this guide. For thorough explanations of the features, see the *AlliedWare Plus Management Software Command Line User's Guide*.

Note
The initial management session of the switch must be from a local (serial port console) management session.

Web Manager Accounts

You must log on to manage the switch. This requires a valid username and password. The switch comes with one web manager account with a username of "manager" and the default password of "friend." Both the username and password are case sensitive. This account gives you access to all management modes and commands.

In the web interface, you can create two additional remote manager accounts. For instructions, see "Managing User Accounts" on page 45. The switch supports up to three manager sessions (this is configurable) at one time.

Chapter 2

Starting a Management Session

This chapter describes how to start a management session using the AlliedWare Plus web interface as well as how to select fields, save your changes, and end a management session. See the following sections:

- '"Starting a Web Management Session" on page 20
- "Selecting items from a Web Page" on page 26
- "What to Configure First" on page 27
- "Saving Your Changes" on page 28
- "Ending a Web Management Session" on page 29

Starting a Web Management Session

Before you start a remote web management session, you must log on to the AlliedWare Plus CLI and assign an IP address to the switch. Also, you must enable web management on the switch which is disabled by default.

To assign an IP address, enable web management, and start a web management session on an AT-9000 switch, do the following:

Note
If you have already assigned the switch an IP address and enabled the web management, start with step 8.

1. Log on to the AlliedWare Plus CLI.

   The Login Menu is shown in Figure 1.

```
Press <ENTER> key to connect...


awplus login:
```

Figure 1. Login Menu

2. Enter “manager” for the login name and press Return.

   You are prompted for a password.

3. Enter “friend” as the password and press Return.

   The “awplus>” prompt indicates that you are logged on to the switch.

4. Assign an IP address and subnet mask to the switch by entering the following commands:

```
awplus> enable

awplus# configure terminal

awplus(config)# interface vlan1

awplus(config-if)# ip address 167.142.10.5/16
```

5. Display the IP address assigned to VLAN 1 by entering the following commands:

```
awplus(config-if)# exit

awplus(config)# exit

awplus# show ip interface
```

   For a display of this command, see Figure 2.

```
awplus# show ip interface

Interface     IP-Address        Status        Protocol
  vlan1-0     167.142.10.5/16 admin up        running
```

Figure 2. Displaying the IP address

6. Enable the web browser on the switch by entering the following commands:

```
awplus# configure terminal

awplus(config)# http server
```

7. Save your changes on the switch by copying the running configuration file to the start-up configuration file. Enter the following command:

```
awplus# copy running-config startup-config
```

8. Open a web browser, such as Microsoft Explorer, and enter one of the following:

   - To start an HTTP session, enter: http:// followed by the IP address of the switch.
   - To start an HTTPS session, enter: https:// followed by the IP address of the switch.

The Login Page is displayed. See Figure 3.

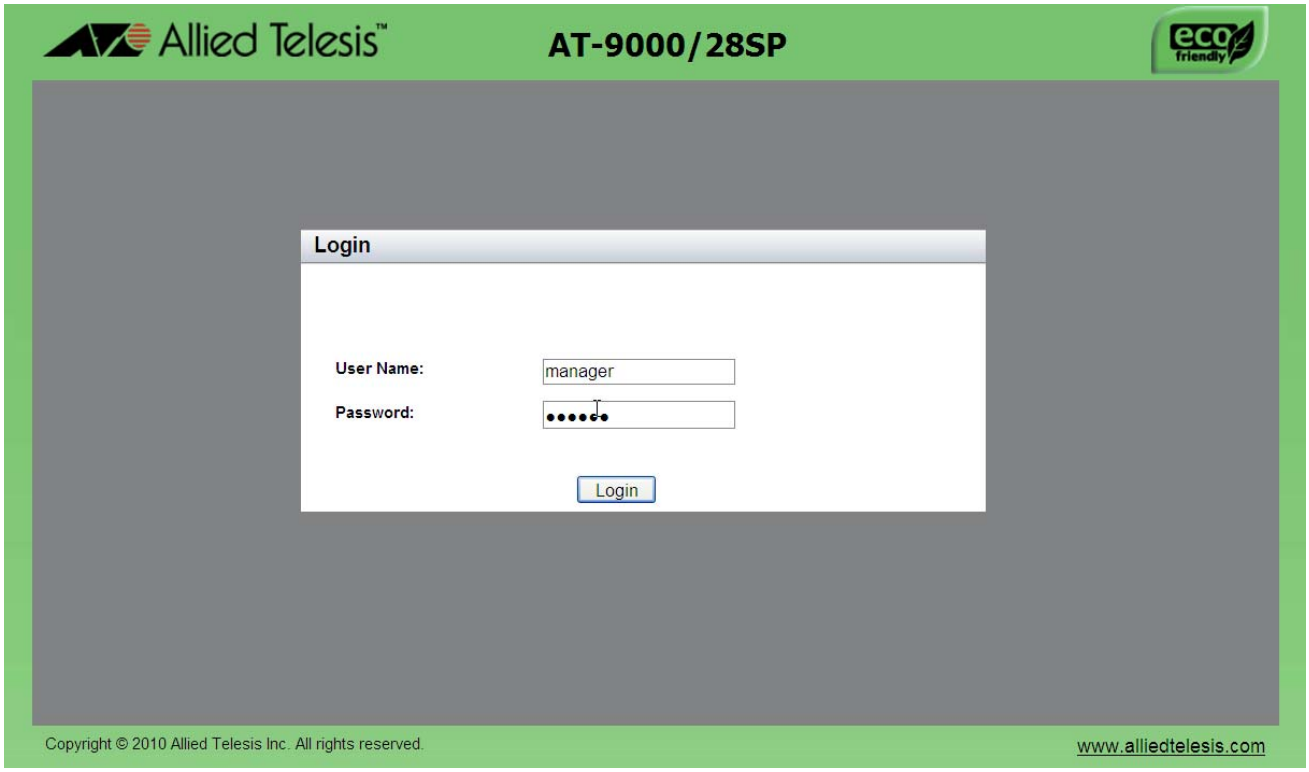


Figure 3. Login Page

9. Enter “manager” in the User Name field and “friend” in the Password field. Then click the **Login** button.

The Dashboard page is displayed. See Figure 4. The Dashboard page is the home page of the switch.

Figure 4. Dashboard Page

The following fields are displayed:

- **Up Time**— Indicates the length of time since the switch was last reset or power cycled in days, hours, minutes and seconds. This field is located in the upper right-hand corner of the page.

The System section displays the following information:

- **Software Version**— Lists the software version number of the AlliedWare Plus software.
- **Build Date/Time**— Lists the month, date, year and time (in the hour:minute:second format) the software version was built.
- **Serial No**.— Lists the unique serial number of the switch.

- **MAC Address**— Specifies the MAC address of the switch.
- **IPv4 Address**— Displays the IPv4 address and subnet mask of the web interface. The IPv4 management address is assigned to the switch. The address is specified in the following format:

  xxx.xxx.xxx.xxx

  Each x is a number from 0 to 255. There are four groups of numbers that are separated by periods.

Note
For IPv4 addresses, the subnet mask is a decimal number that represents the number of bits, from left to right, that constitute the network portion of the address. Here are some examples:
— The decimal mask 16 is equivalent to the mask 255.255.0.0.
— The decimal mask 24 is equivalent to the mask 255.255.255.0.

- **IPv4 Gateway**— Displays the IPv4 address of the next hop of the switch's default route. The switch uses a default route when it must communicate with a device that is not on the local IPv4 network.
- **System Name**— Indicates the name of the switch. To configure this field, see "Setting the Switch Information" on page 41.
- **System Contact**— Indicates the contact person for the switch. To configure this field, see "Setting the Switch Information" on page 41.
- **System Location**— Indicates the location of the switch. To configure this field, see "Setting the Switch Information" on page 41.
- **Management VLAN**— Displays the management VLAN assigned to the switch. The default VLAN is "VLAN1."
- **IPv6 Address**— Displays the IPv6 address and subnet mask of the web interface. An IPv6 management address for the switch is entered in the following format:

  nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn

  Where "n" is a hexadecimal digit from 0 to F. The eight groups of digits are separated by colons. Groups where all four digits are '0' can be omitted. Leading '0's in groups can also be omitted.

For example, the following IPv6 addresses are equivalent:

12c4:421e:09a8:0000:0000:0000:00a4:1c50

12c4:421e:9a8::a4:1c50

- **IPv6 Gateway**— Displays the IPv6 address of the next hop of the switch's default route. The switch uses a default route when it must communicate with a device that is not on the local IPv6 network.

The Services section displays the following information:

- **SNMP**— Indicates the SNMP setting of the switch.
- **HTTP**— Indicates the HTTP setting of the switch
- **Telnet**— Indicates if Telnet is enabled or disabled on the switch.
- **SSH**— Indicates if SSH is enabled or disabled on the switch.
- **Spanning Tree**— Indicates if RSTP or STP is enabled on the switch. The default setting is "RSTP."
- **QoS**— Indicates is QoS is enabled or disabled on the switch.
- **LLDP**— Indicates if LLDP is enabled or disabled on the switch.
- **SFLOW**— Indicates is sFlow is enabled or disabled on the switch.
- **802.1x Port Authentication**— Indicates if 802.1x Port Authentication is enabled or disabled on the switch.
- **Remote Logging**— Indicates if the remote log is enabled or disabled on the switch.
- **IGMP Snooping**— Indicates if IGMP Snooping is enabled or disabled on the switch.

The Administration Options section displays the following information:

- **System Upgrade**— Select this field to upgrade your system software. See "Upgrading the Software" on page 51.
- **Reboot**— Select this field to reboot the switch. For instructions, see "Rebooting a Switch" on page 50.

Selecting items from a Web Page

To select a feature or parameter, place your cursor over the selection and wait for it to turn orange. Then click on the selection.

What to Configure First

Here are a few suggestions on what to configure during your web management session on the switch. The initial management session must be a local management session from the Console port on the switch. For instructions on how to start a local management session, refer to "Starting a Web Management Session" on page 20.

Assigning a Name to the Switch

The switch is easier to identify if you assign it a name. The switch's name is displayed on the Dashboard page. See Figure 4 on page 23. To change the name of the switch, see "Setting the Switch Information" on page 41.

A name can be up to 39 alphanumeric characters. Spaces and quotation marks are not permitted.

Adding a Management IP Address

You must assign the switch a management IP address before you can access the web interface. In addition, you may assign the switch both an IPv4 and an IPv6 address. See Chapter 17, "Setting IPv4 and IPv6 Management" on page 187.

Here are the requirements:

- The switch can have one management IPv4 address and one management IPv6 address.
- The switch can have one IPv4 default gateway and one IPv6 default gateway.
- A management IP address must be assigned to a VLAN on the switch. It can be any VLAN, including the Default_VLAN which is "VLAN1." For background information on VLANs, refer to the *AlliedWare Plus Version 2.1.1 Command Line User's Guide*.
- The network devices (such as, syslog servers, TFTP servers, etc.) must be members of the same subnet as a management IP address or have access to it through routers or other Layer 3 devices.
- The switch must have a default gateway if the network devices are not members of the same subnet as the management IP address. The default gateway specifies the IP address of a router interface that represents the first hop to the subnets or networks of the network devices.
- A default gateway address, if needed, must be a member of the same subnet as a management IP address.

Setting System Time

To set the system time either manually or with an NTP server, see "Setting the System Date and Time" on page 32.

Saving Your Changes

In the web interface, there are two ways to save your changes. After you complete a procedure, click **Apply** as shown on the System Contact Information page. See Figure 5. This saves the information to the running configuration file. This information is not saved when you reboot the switch.

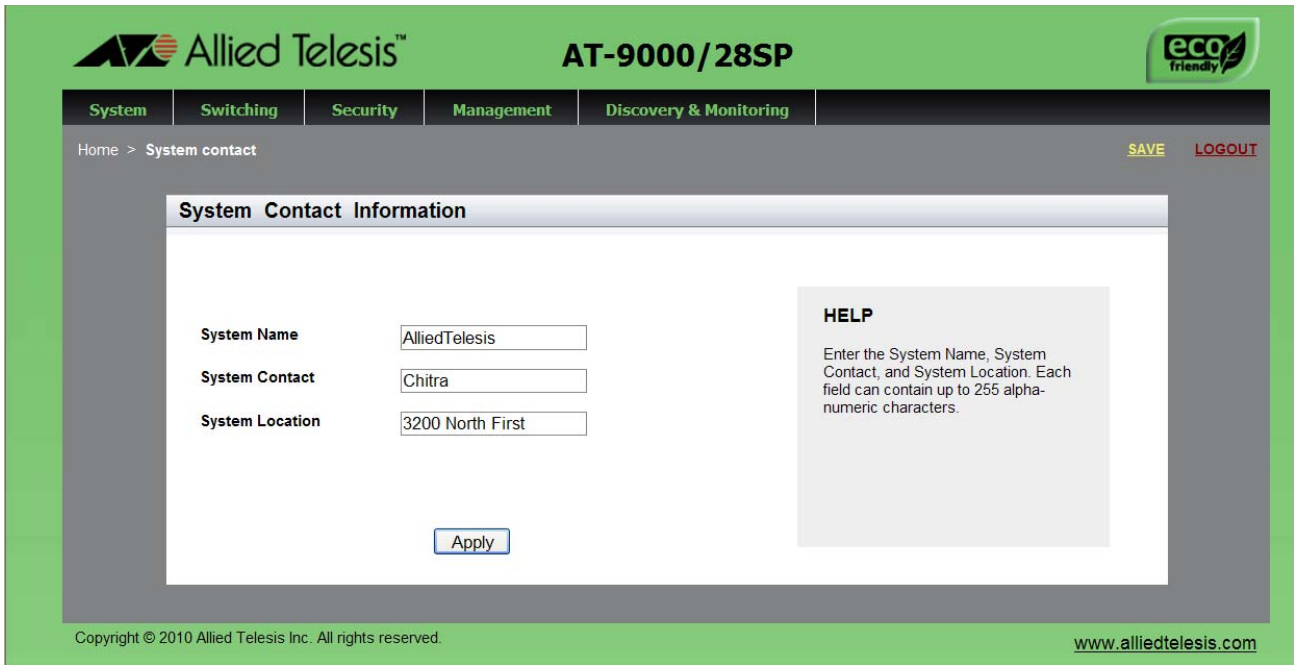


Figure 5. System Contact Information Page

To permanently save your changes in the start-up configuration file, click **SAVE** at the top of the web page.

Ending a Web Management Session

To end a web management session, select **LOGOUT** at the top of the web page. For an example, see the System Contact Information page in Figure 5 on page 28.

Chapter 3

Basic Switch Parameters

This chapter describes how to set up basic switch operations in the web interface. See the following sections:

- ❒ “Setting the System Date and Time” on page 32
- ❒ “Setting a Telnet or SSH Server” on page 38
- ❒ “Setting a Remote Log Server” on page 40
- ❒ “Setting the Switch Information” on page 41
- ❒ “Setting the Configuration File” on page 43
- ❒ “Managing User Accounts” on page 45
- ❒ “Rebooting a Switch” on page 50
- ❒ “Upgrading the Software” on page 51
- ❒ “Returning the AlliedWare Plus Management Software to the Factory Default Values” on page 53
- ❒ “Displaying System Information” on page 54

For additional information about basic port settings, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 5: Basic Switch Management
- ❒ Chapter 6: Basic Switch Management Commands

Setting the System Date and Time

This procedure explains how to set the switch's date and time. Setting the date and time is important if you plan to view the events in the switch's event log or send the events to a syslog server. The correct date and time are also important if the management software sends traps to a management workstation or if you plan to create a self-signed SSL certificate. Events, traps, and self-signed certificates should contain the date and time of when they occurred or, in the case of certificates, when they were created.

There are two ways to set the switch's date and time. One method is to set it manually. This method is not recommended because the date and time are lost if you reboot the switch.

The second method uses the Simple Network Time Protocol (SNTP). The AlliedWare Plus Management Software comes with the client version of this protocol. You can configure the AlliedWare Plus software to obtain the current date and time from an SNTP or Network Time Protocol (NTP) server located on your network or the Internet.

SNTP is a reduced version of the NTP. However, the SNTP client software in the AlliedWare Plus Management Software is interoperable with NTP servers.

Note
In order for the management software on the switch to communicate with an SNTP or NTP server, there must be an interface on the local subnet from where the switch is reaching the server. The switch uses the IP address of the interface as its source address when sending packets to the server.

Note
The default system time on the switch is midnight, January 1, 2000.

Choose from the following procedures:

- "Setting System Time Manually" on page 33
- "Setting An SNTP or NTP Server" on page 35

Setting System Time Manually

To set the system time manually, do the following:

1. Select the **System** tab.
2. From the System tab, select **System Settings**.

   The System Settings Tab is displayed in Figure 6.

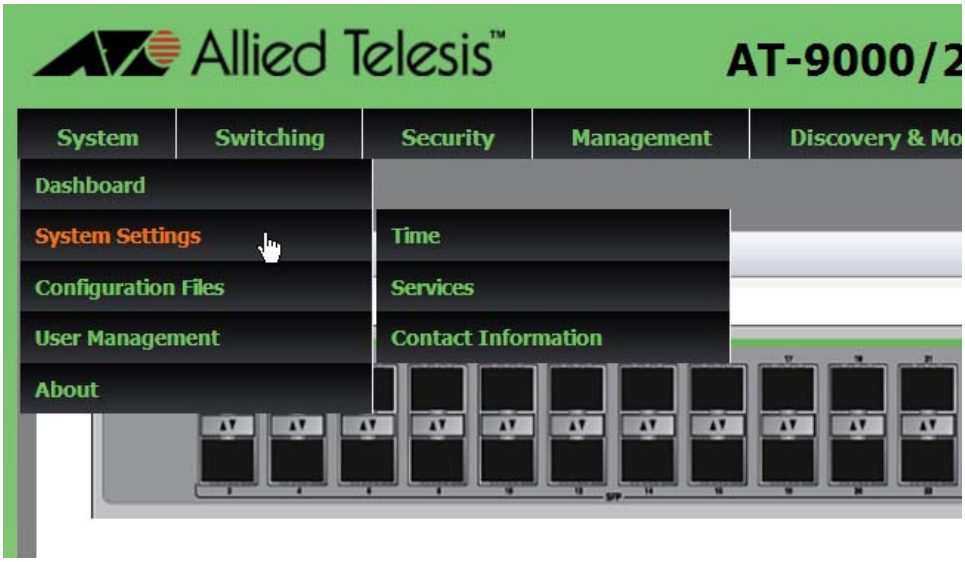


Figure 6. System Settings Tab

3. Move the cursor to the right and select **Time**.

   The System Time Settings page is displayed. See Figure 7 on page 34.

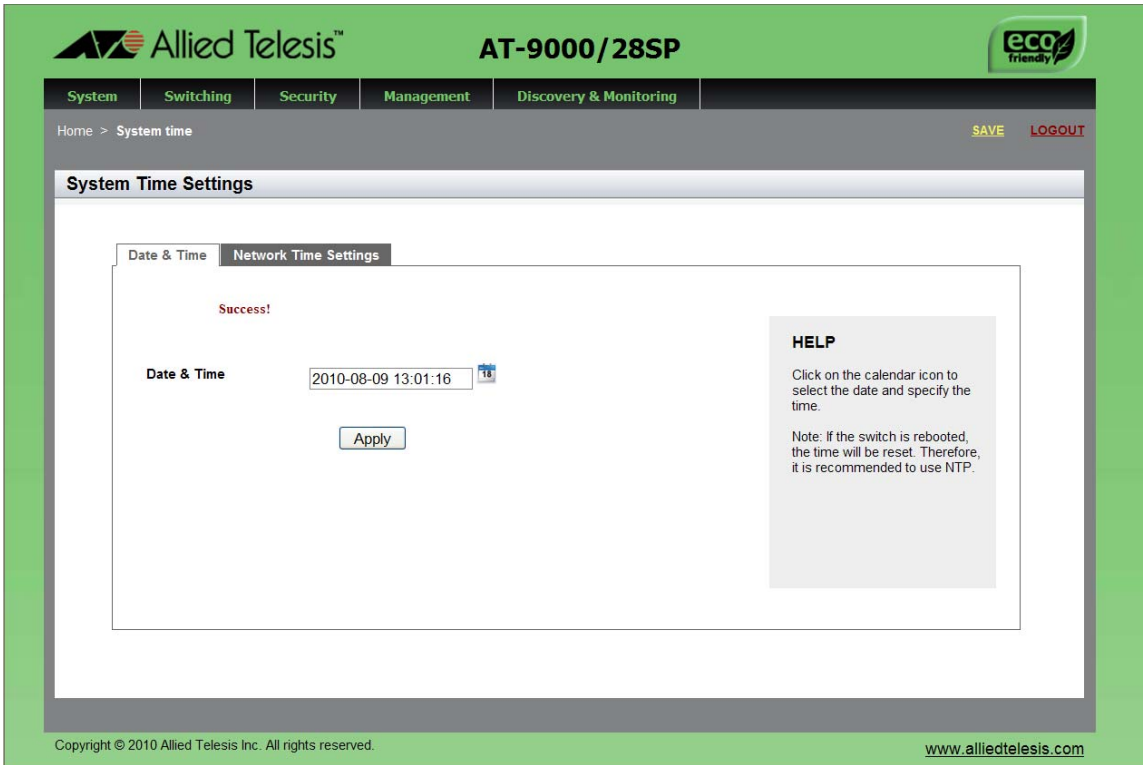


Figure 7. System Time Settings Page

4. There are two ways to set the date and time manually. Use either step 4 or step 5. To type in the system date and time in the **Date & Time** field, do the following:

   a. Enter the time and date in the following format:

      yyyy-dd-mm hh:mm:ss

   b. Click **Apply**.

5. Select the calendar icon.

   The Calendar page is displayed. See Figure 8 on page 35.

   a. Use the arrows at the top of the Calendar to select the month and year.

   b. Click on the day of the month.

   c. Set the time of day using the following format:
      hh:mm:ss

d. Close the Calendar page. See Figure 8.

Figure 8. Calendar Page

6. Enter the time at the bottom of the page in the hh:mm:ss format.
7. Click **Apply**

Setting An SNTP or NTP Server

To configure SNTP or NTP server, do the following:

1. Select the **System** tab.

   The System Settings Tab is displayed. See Figure 6 on page 33.

2. From the System tab, select **System Settings**.
3. Move the cursor to the right and select **Time**.

   The System Time Settings Page page is displayed. For an example of this page, see Figure 7 on page 34.

4. Select the **Network Time Settings** tab.

   The Network Time Settings page is displayed. See Figure 9 on page 36.

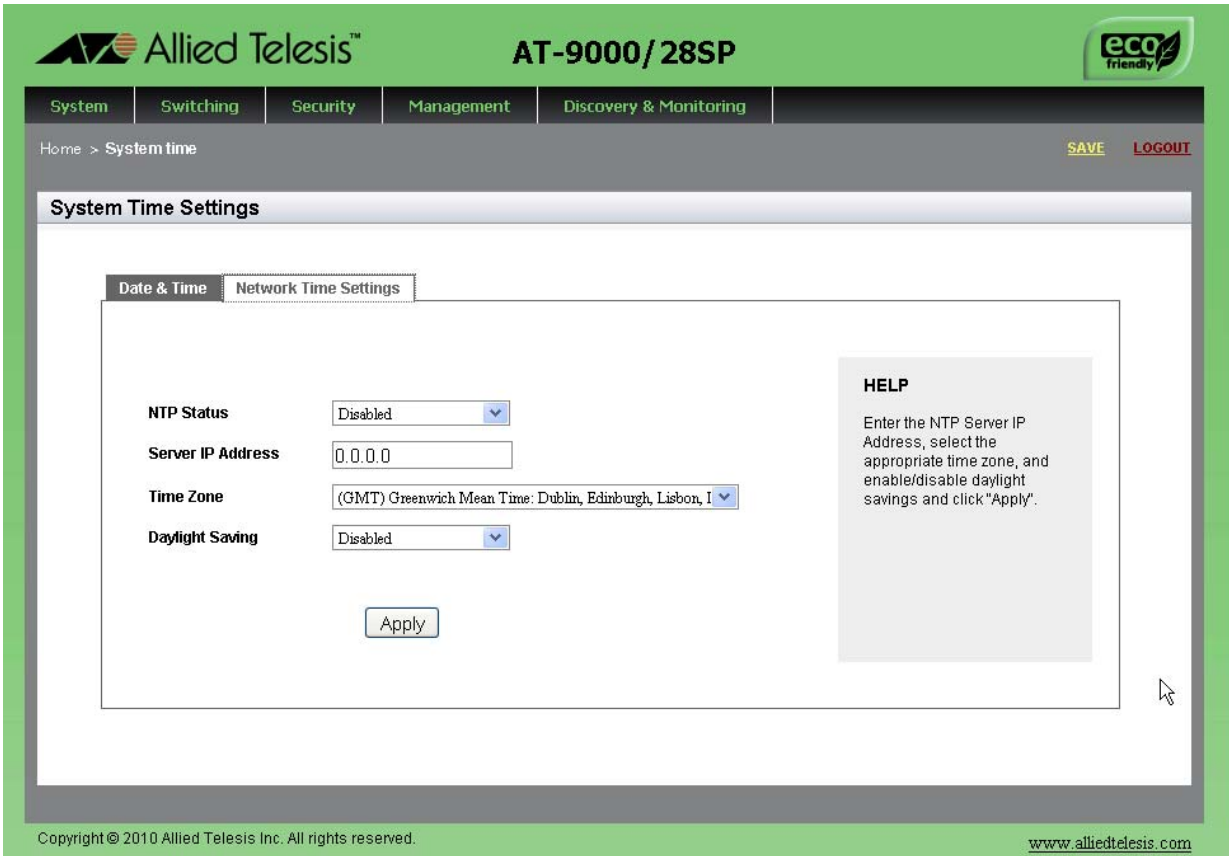


Figure 9. System Time Settings Page with Network Time Settings Tab

5. To configure the switch to obtain its date and time from an SNTP or NTP server on your network or the Internet, configure the following fields:

   - **NTP Status**— Enables or disables the SNTP client on the switch. The default is disabled.
   - **Server IP Address**— Specifies the IP address of an SNTP server. Enter either an IPv4 or IPv6 IP address.

     The IPv4 format is: xxx.xxx.xxx.xxx where x is a decimal number from 0 to 255.

     The IPv6 format is: nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn where n is a hexadecimal digit from 0 to F.
   - **Time Zone**— Specifies the time zone as a measurement of Greenwich Mean Time (GMT) which is the default setting. Use the pull-down menu to select the other time zones.
   - **Daylight Savings Time (DST)**— Enables or disables the system's adjustment for daylight savings time. The default is disabled.

Note
The switch does not set DST automatically. If the switch is in a locale that uses DST, you must remember to enable this in April when DST begins and disable it in October when DST ends. If the switch is in a locale that does not use DST, this option should be set to disabled all the time.

Note
If the local interface on the switch is obtaining its IP address and subnet mask from a DHCP server, you can configure the server to provide the interface with an IP address of an NTP or SNTP server. If you configured the server to provide this address, then you do not need to enter it here.

6. When you finish configuring the parameters, click **Apply**.

   If you enabled the SNTP client, the switch immediately polls the SNTP or NTP server for the current date and time. (When SNTP is enabled, the switch automatically polls the server whenever a change is made to any of the fields on this page.)

Setting a Telnet or SSH Server

The AlliedWare Plus Web Browser interface allows you to configure the switch as a Telnet or SSH server.

You can use the web browser interface to enable a Telnet server, but not as a Telnet client. The Telnet client is only supported from local management sessions of the switch. For information about how to use a Telnet client, see the *AlliedWare Plus Management Software Command Line Interface User's Guide*. See Where to Find Management Software Updates and Product Information on page 13.

To enable an SSH server in the web interface, you must first create an encryption key in the CLI interface. Then you can enable the SSH server in the web interface.

The procedures in this section allow you to configure the switch as a Telnet or SSH server.

To assign the switch to a Telnet or SSH server, do the following:

1. From the home page, select the **System** tab.

   The System Settings tab is displayed. See Figure 6 on page 33.

2. From the System Settings tab, select **Services**.

The System Services page is displayed. See Figure 10.

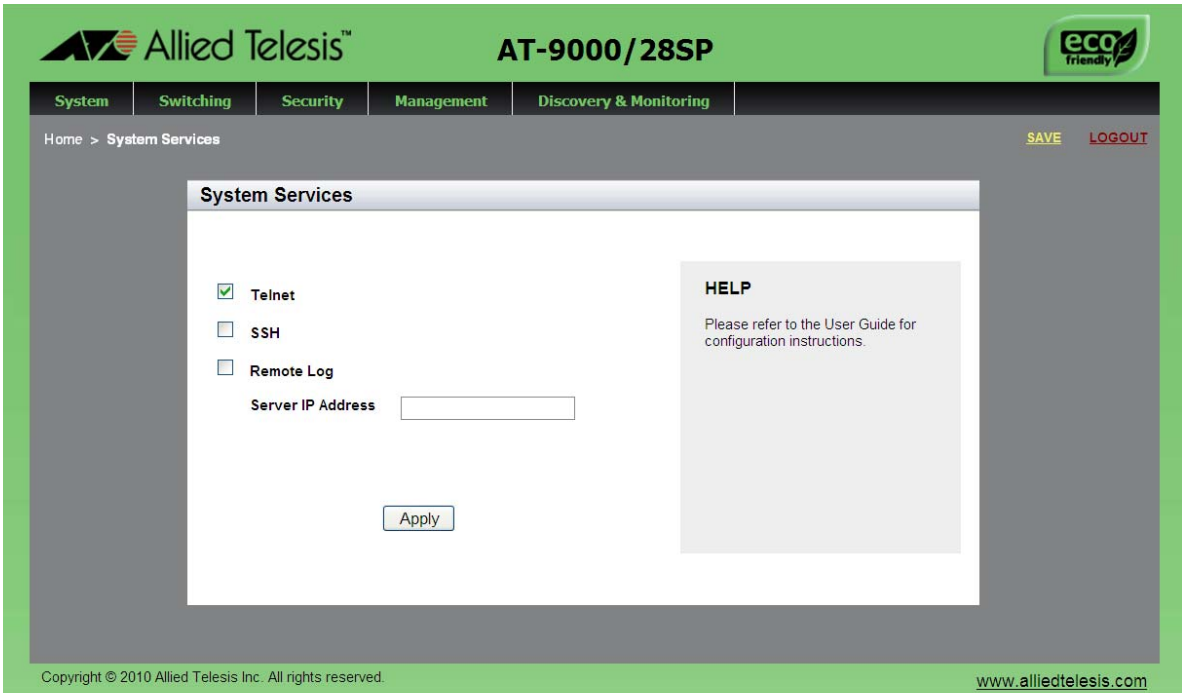


Figure 10. System Services Page

3. Configure the following parameters as necessary:

   - **Telnet**— Selecting this field enables a Telnet server on the switch. To disable a Telnet server on the switch, unclick the box next to the Telnet field. This parameter is optional.
   - **SSH**— Selecting this field enables an SSH server on the switch. To disable an SSH server on the switch, unclick the box next to the SSH filed. This parameter is optional.

   Note
   Both the Remote Log and Server IP Address fields are used only to set a remote log server. For information on these fields, see "Setting a Remote Log Server" on page 40.

   - **Remote Log**— This field is only used for the remote log server.
   - **Server IP Address**— This field is only used for the remote log server.

4. Click **Apply.**

5. Click **SAVE** to save your changes on the switch.

Setting a Remote Log Server

You can use the AlliedWare Plus Web browser interface to assign the switch to a remote log server which is part of the Syslog feature. However, you must use the CLI to view or clear the event log. For information about the CLI, see the SysLog chapters in the *AlliedWare Plus Management Software Command Line Interface User's Guide*.

To activate remote logging on the switch, do the following:

1. Select the **System** tab.

   The System Settings tab is displayed. See Figure 6 on page 33.

2. From the System Settings tab, select **Services**.

   The System Services page is displayed. See Figure 10 on page 39.

3. Configure the following parameters as necessary:

   - **Remote Log—** Enables the switch to send status and error messages to a remote log server. This parameter is optional.
   - **Server IP Address**— Specifies the IP address of the remote log server. This field is mandatory if you selected the Remote Log field above. You can enter the IP address in the IPv4 format: xxx.xxx.xxx.xxx.

     where each x is a decimal number from 0 to 255. The numbers are separated by periods.

4. Click **Apply.**

5. Click **SAVE** to save your changes on the switch.

Setting the Switch Information

This procedure allows you to set information about the switch such as a switch name, contact, and location. Assigning a name to the switch helps you identify your switches when you manage them and help you to avoid performing a configuration procedure on the wrong switch.

To assign a name, location, and contact to a switch, perform the following procedure:

1. From the home page, select the **System tab**.
2. From the System tab, select **System Settings**.

   The System Setting tab is displayed. See Figure 6 on page 33.
3. Move the cursor to the right and select **Contact Information**.

   The System Contact Information page is displayed. See Figure 11.

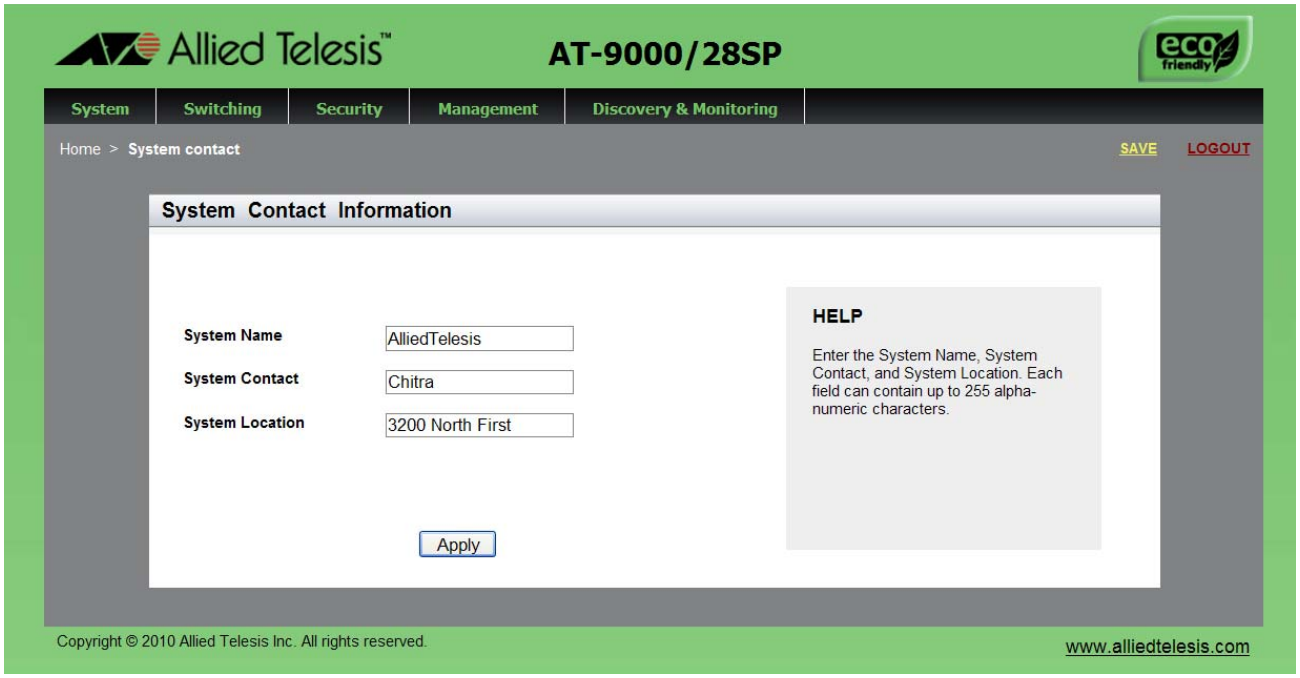


Figure 11. System Contact Information Page

Change the following parameters as necessary:

- **System Name**— Specifies a name for the switch (for example, Sales Ethernet switch). The name is displayed only on the Dashboard page. The name can be from 1 to 39 characters in length. It can include spaces and special characters, such as dashes and asterisks. By default, there is no system name. This parameter is optional.
- **System Contact —** Specifies the name of the network administrator responsible for managing the switch. The name can be from 1 to 20 characters. It can include spaces and special characters, such as dashes and asterisks. The default is no name. This parameter is optional.
- **System Location—** Specifies the location of the switch, (for example, 4th Floor - room 402B). The location can be from 1 to 20 characters. The location can include spaces and special characters, such as dashes and asterisks. The default is no location. This parameter is optional.

4. Click **Apply**.
5. Click **SAVE** to activate your changes on the switch.

Setting the Configuration File

Within the web browser interface, you can upload a configuration file on to the switch, download a configuration file from the switch, or delete a configuration file. In addition, you can save your changes to the current configuration file. However, to create a new configuration file, you need to access the switch through the CLI.

The file that you select in this procedure is file that the switch uses the next time you reboot the switch.

See the following procedures:

- "Displaying and Setting the Active Configuration File" on page 43
- "Uploading a Configuration File" on page 44

Displaying and Setting the Active Configuration File

The file you select in this procedure is the active configuration file after you reboot the switch.

To select the active configuration file, do the following:

1. From the home page, click the **System** tab.

   The System Settings tab is displayed. See Figure 6 on page 33.

2. From the System tab, select **Configuration Files** from the pull-down menu.

   For an example of the Configuration Files page, see Figure 12.

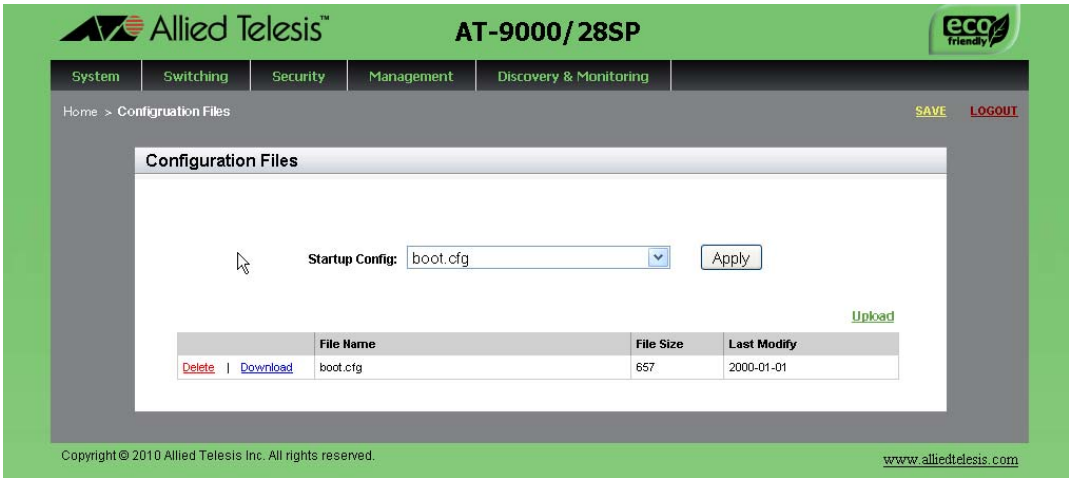


Figure 12. Configuration Files Page

The following fields are displayed:

- **Startup Config**— Displays the name of the active boot configuration file, which for the switch in the example is “boot.cfg.”
- **File Name**— Indicates the name of the configuration files.
- **File Size**— Lists the file size in bytes.
- **Last Modify**— Indicates the date the configuration file was last modified. The format is year, month, date.

3. Use the pull-down menu to select the active configuration file. Then click **Apply**.

   The file you select is the active configuration file after you reboot the switch.

4. Click **SAVE**.

Uploading a Configuration File

To upload a configuration file onto the switch, do the following:

1. From the home page, click the **System** tab.

   For an example of the System tab, see Figure 11 on page 41.

2. From the System tab, select **Configuration Files**.

   For an example of the **Configuration Files** page, See Figure 12 on page 43.

3. Click **Upload**.

   The File Upload page is displayed. See Figure 13.

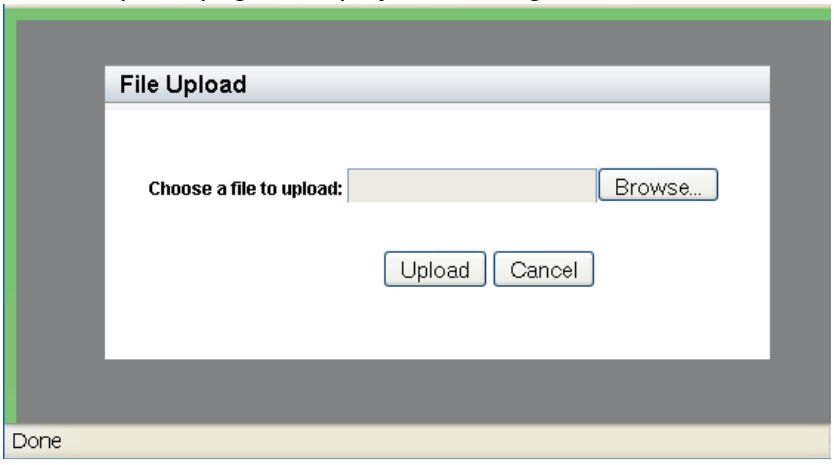


Figure 13. File Upload Page

4. Click **Browse** to select a file to upload onto the switch.

5. Select the file and then click **Upload**.

Managing User Accounts

The procedures in this section describe how to create user accounts as well as change passwords and privileges. There is also a procedure that describes how to delete a user account. See the following:

- ❒ "Adding a User" on page 45
- ❒ "Changing a User Password" on page 46
- ❒ "Changing the User Privilege" on page 48
- ❒ "Deleting a User" on page 49

Adding a User

To add a user, do the following:

1. From the home page, click the **System** tab.

   The System Settings tab is displayed, see Figure 6 on page 33.

2. From the System Settings tab, select **User Management**.

   For an example of the User Management page, see Figure 14.

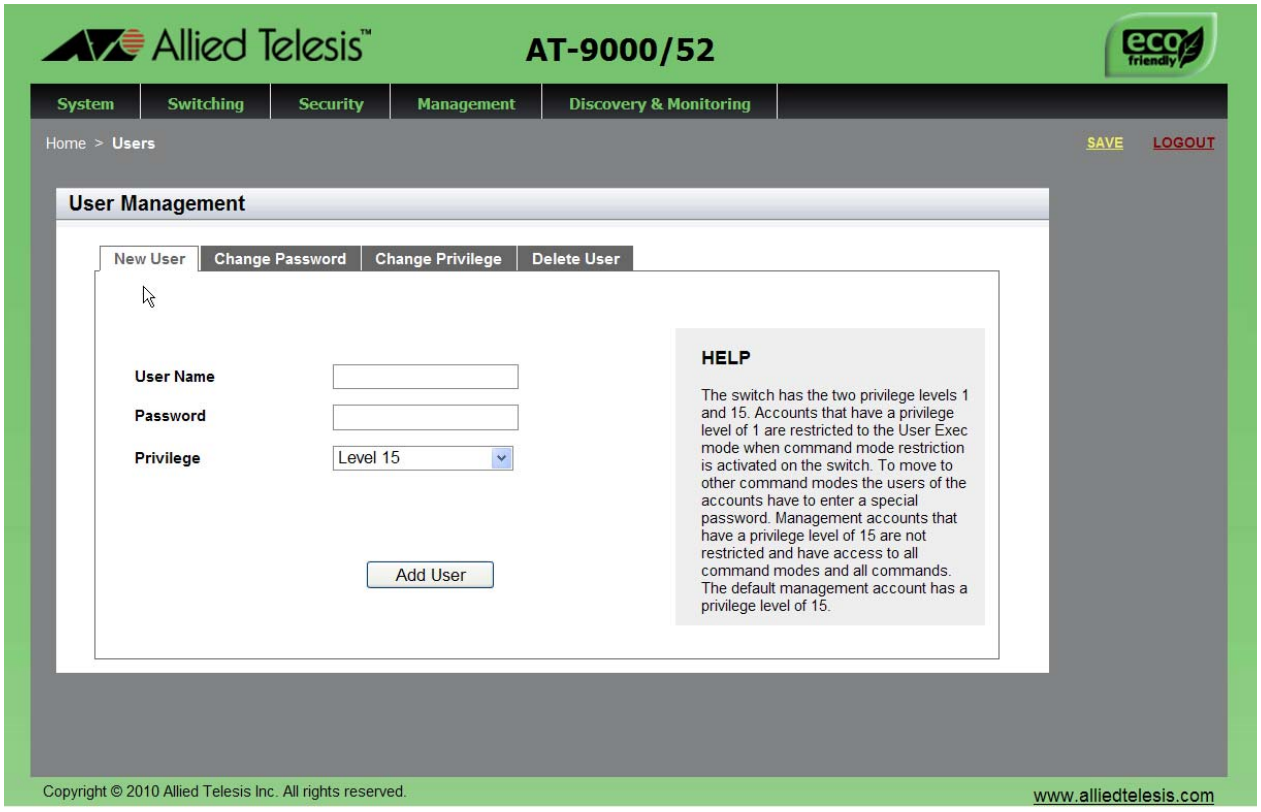


Figure 14. User Management Page

3. Enter a name in the **User Name** field.

   This field specifies the log on name for the new account. The name is case sensitive and can contain up to fifteen alphanumeric characters. Spaces and special characters are not allowed.

4. Enter a password in the **Password** field.

   This specifies the password for the new management account. You can enter the password in plaintext or encrypted. A plaintext password can consist of up to 16 alphanumeric characters and is case-sensitive. Spaces and special characters are not allowed. To enter an already encrypted password, precede it with the number “8.”

   Note
   A plaintext password that begins with the number “8” is *not* encrypted.

5. Use the pull-down menu in the **Privilege** field to select a user privilege level. Choose from the following:

   - Level 15: Management accounts with a user level of 15 have unrestricted access to the software. This is the default setting.
   - Level 1: Management accounts with a user level of 1 have restricted access to the software.

6. Click **Add User**.

7. Click **SAVE**.

Changing a User Password

To change a user password, do the following:

1. From the home page, click the **System** tab.

   The System Settings Tab is displayed. See Figure 6 on page 33.

2. From the System Settings tab, select **User Management**.

   The User Management page is displayed. See Figure 14 on page 45.

3. From the User Management page, select the **Change Password** tab.

   The User Management page with the Change Password tab is displayed. See Figure 15 on page 47.

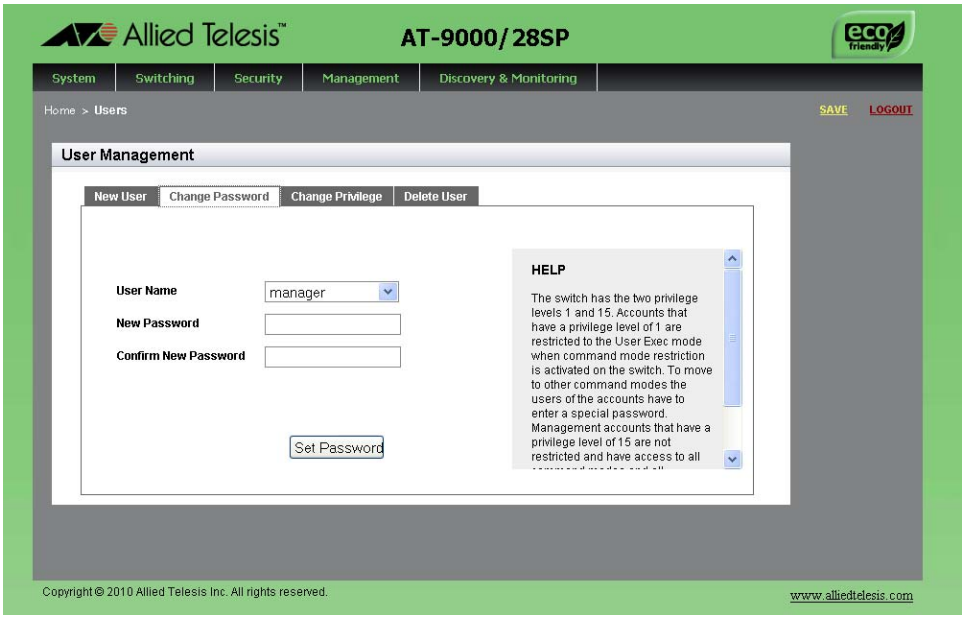


Figure 15. User Management Page with Change Password Tab

4. Use the pull-down menu next to the **User Name** field to select the user name.

   The user name must already exist.

5. Enter a new password in the **New Password** field.

   You can enter the password in plaintext or encrypted. A plaintext password can consist of up to 16 alphanumeric characters and is case-sensitive. Spaces and special characters are not allowed. To enter an already encrypted password, precede it with the number "8."

   Note
   A plaintext password that begins with the number "8" is *not* encrypted.

6. Re-enter the new password in the **Confirm New Password** field.

7. Click **Set Password**.

8. Click **SAVE**.

Changing the User Privilege

To change a privilege of a user, do the following:

1. From the home page, click the **System** tab.

   The System Settings Tab is displayed. See Figure 6 on page 33.

2. From the System Settings tab, select **User Management**.

   The User Management page is displayed. See Figure 14 on page 45.

3. From the User Management page, select the **Change Privilege** tab.

   The User Management page with the Change Privilege tab is displayed. See Figure 16.

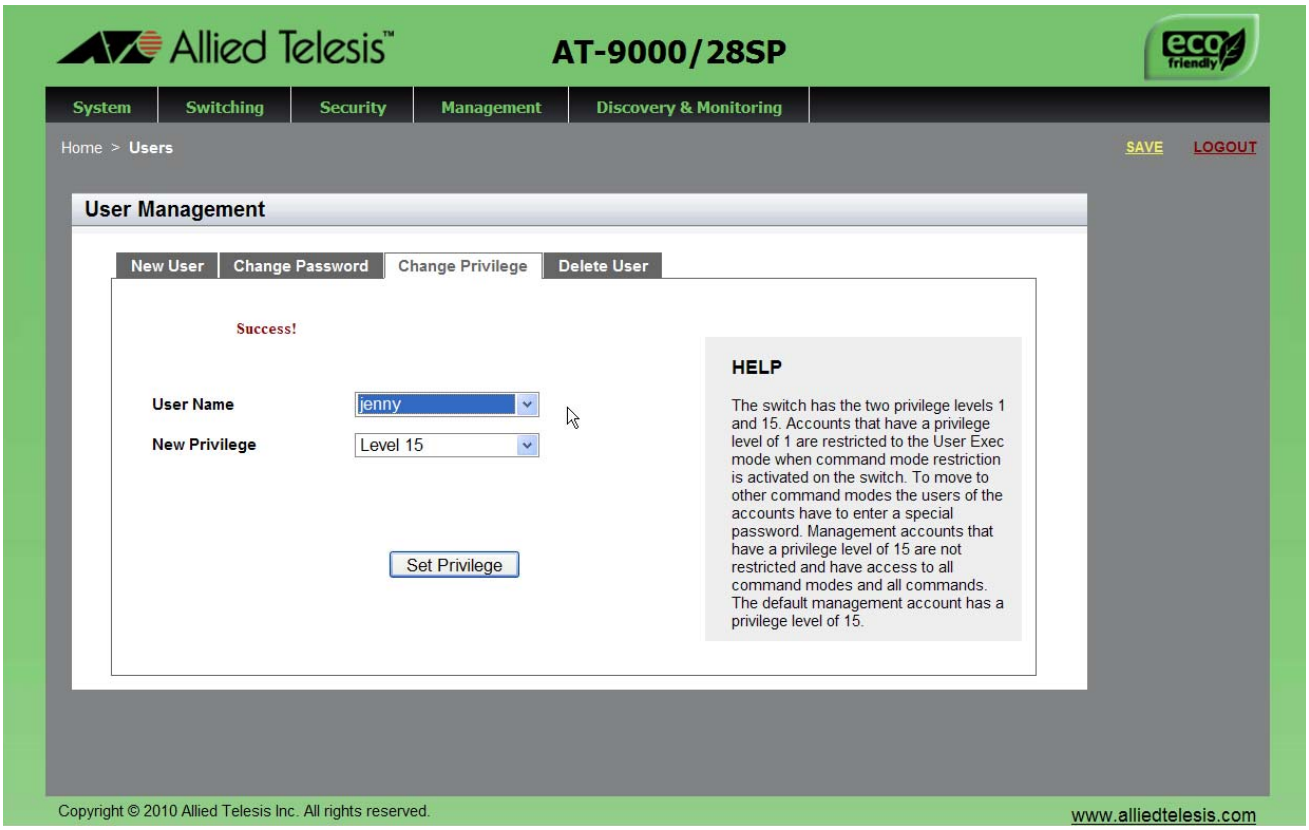


Figure 16. User Management Page with Change Privilege Tab

4. Use the pull-down menu next to the User Name field to select a user.

5. Use the pull-down menu next the New **Privilege** field to select a user privilege level. Choose from the following:

   - Level 15: Management accounts with a user level of 15 have unrestricted access to the software. This is the default setting.

- Level 1: Management accounts with a user level of 1 have restricted access to the switch.

6. Click **Set Privilege**.
7. Click **SAVE** to save your changes to the start-up configuration file.

Deleting a User

To delete a user name from the switch, do the following:

1. From the home page, click the **System** tab.

   The System Settings Tab is displayed. See Figure 6 on page 33.

2. From the System Settings tab, select **User Management**.

   The User Management page is displayed. See Figure 14 on page 45.

3. From the User Management page, select the **Delete User** tab.

   The User Management page with the Delete User tab is displayed. See Figure 17.

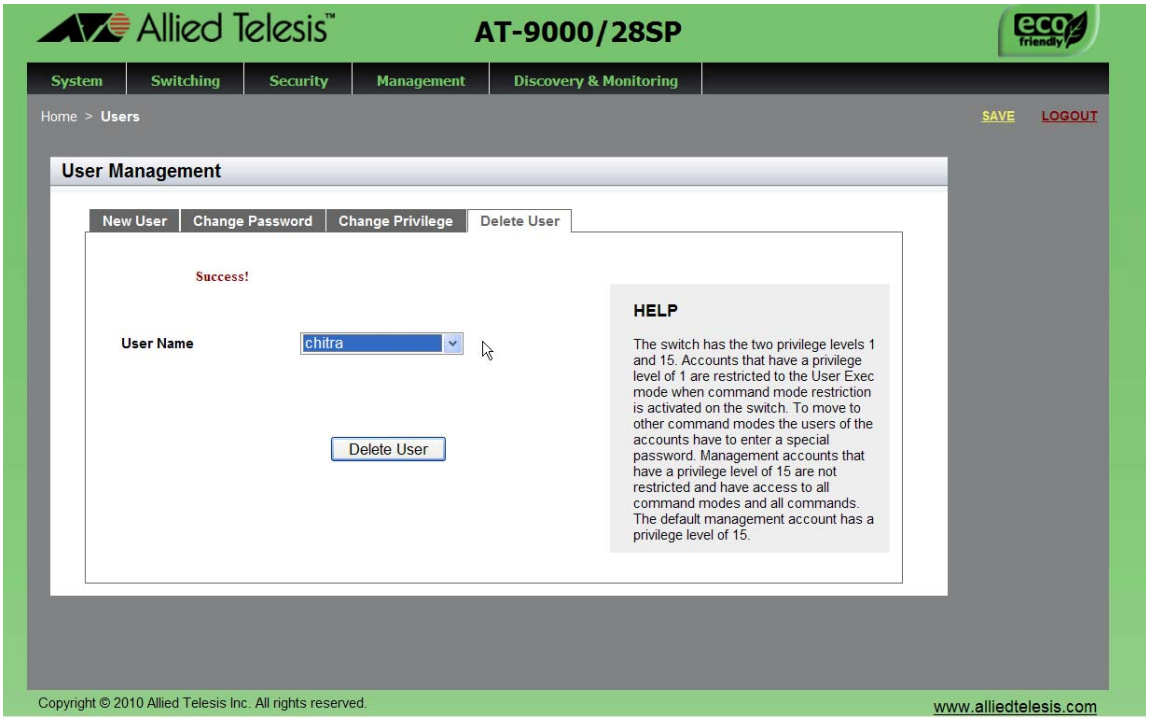


Figure 17. User Management Page with Delete User Tab

4. Use the pull-down menu to select a user.
5. Click **Delete User**.
6. Click **SAVE**.

Rebooting a Switch

Resetting the switch ends your web browser management session. To continue managing the switch, you must login again.

Note
All unsaved changes are discarded when you reset a switch. To save your changes, click **SAVE** on the home page.

To reboot a switch, perform the following procedure:

1. Select the **System Tab**.

   The System Settings Tab is displayed. See Figure 6 on page 33.

2. From the System Settings tab, select **Dashboard**.

   The Dashboard Page is displayed. See Figure 4 on page 23.

3. Select **Reboot** at the bottom of the page.

   A confirmation prompt is displayed that indicates that the connection to the web is lost during a reboot.

4. Click **OK** to reset the switch or **Cancel** to cancel the procedure.

Note
The switch does not forward packets while it initializes the AlliedWare Plus software and loads its active configuration file. This process takes between 20 seconds to 2 minutes to complete, depending on the number and types of commands in the configuration file.

Upgrading the Software

You can obtain the latest version of the AlliedWare Plus software from the Allied Telesis web site. You must have access to a TFTP server from your PC to upgrade the AlliedWare Plus software on your switch. Allied Telesis does not include this application with the software. The upgrade process takes approximately three minutes.

Upgrading the system software on the switch ends your current web browser management session. To continue managing the switch, you must login again.

> **Note**
> All unsaved changes are discarded when you upgrade the software on a switch. To save your changes, click **SAVE**.

To upgrade the AlliedWare Plus software, perform the following procedure:

1. Open your TFTP server software and provide it with the IP address of the your PC.
2. Select the **System Tab**.

   The System Settings Tab is displayed. See Figure 6 on page 33.
3. From the System Settings tab, select **Dashboard**.

   The Dashboard Page is displayed. See Figure 4 on page 23.
4. Select **System Upgrade** at the bottom of the page.

   The System Upgrade page is displayed. See Figure 18 on page 52.

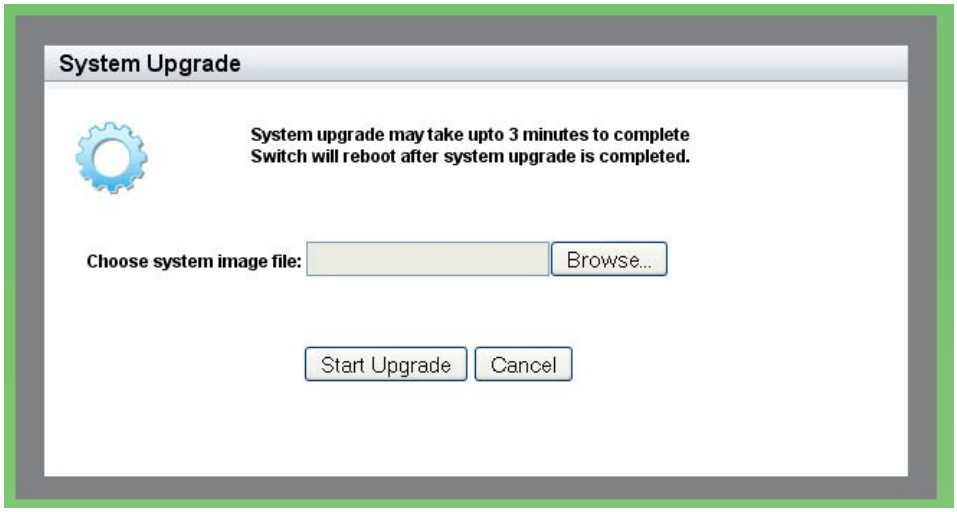


Figure 18. System Upgrade Page

5. Click **Browse** to select an image file.
6. Click **Open** to select a file.
7. Click **Start Upgrade** to begin the software upgrade or **Cancel** to cancel the procedure.

Returning the AlliedWare Plus Management Software to the Factory Default Values

To reset the AlliedWare Plus Management Software parameters to their default values, you must use the Command Line Interface. You cannot reset the management software to its factory settings in the web interface. For instructions, see Chapter 5: Basic Switch Management in the *AlliedWare Plus Management Software Command Line User's Guide* on our web site. To locate manuals online, see Where to Find Management Software Updates and Product Information on page 13.

Displaying System Information

To view basic information about the switch, do the following:

1. Select the **System** Tab.

   The Dashboard Page is displayed. See Figure 4 on page 23.

   The following fields are displayed:

   - **Up Time**— Indicates the length of time since the switch was last reset or power cycled in days, hours, minutes and seconds.

   The System section displays the following information:

   - **Software Version**— Lists the software version number of the AlliedWare Plus software.
   - **Build Date/Time**— Lists the month, date, year and time (in the hour:minute:second format) the software version was built.
   - **Serial No.**— Lists the unique serial number of the switch.
   - **MAC Address—** Specifies the MAC address of the switch.
   - **IPv4 Address**— Displays the IPv4 address and subnet mask of the web interface. The IPv4 management address to assigned the switch. The address is specified in the following format:

     xxx.xxx.xxx.xxx

     Each “x” is a decimal number from 0 to 255. The numbers must be separated by periods.

     Note
     For both the IPv4 and IPv6 addresses, the subnet mask is a decimal number that represents the number of bits, from left to right, that constitute the network portion of the address. Here are some examples:
     — The decimal mask 16 is equivalent to the mask 255.255.0.0.
     — The decimal mask 24 is equivalent to the mask 255.255.255.0
     — The IPv6 decimal mask 24 is equivalent to the mask FFFF:FF00::0.

   - **IPv4 Gateway**— Displays the IPv4 address of the next hop of the switch’s default route. The switch uses a default route when it receives a network packet for routing, but it cannot find an available route in the routing table.
   - **System Name**— Indicates the name of the switch. To configure this field, see “Setting the Switch Information” on page 41.

- **System Contact**— Indicates the contact person for the switch. To configure this field, see "Setting the Switch Information" on page 41.
- **System Location**— Indicates the location of the switch. To configure this field, see "Setting the Switch Information" on page 41.
- **Management VLAN**— Displays the management VLAN assigned to the switch. The default VLAN is "VLAN1."
- **IPv6 Gateway**— Displays the IPv6 address of the next hop of the switch's default route. The switch uses a default route when it receives a network packet for routing, but it cannot find an available route in the routing table.
- **IPv6 Address**— Displays the IPv6 address and subnet mask of the web interface. An IPv6 management address for the switch is entered in the following format:

  nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn

  Where "n" is a hexadecimal digit from 0 to F. The eight groups of digits are separated by colons. Groups where all four digits are '0' can be omitted. Leading '0's in groups can also be omitted. For example, the following IPv6 addresses are equivalent:

  12c4:421e:09a8:0000:0000:0000:00a4:1c50

  12c4:421e:9a8::a4:1c50

The Services section displays the following information:

- **SNMP**— Indicates the SNMP setting of the switch.
- **HTTP**— Indicates the HTTP setting of the switch
- **Telnet**— Indicates if Telnet is enabled or disabled on the switch.
- **SSH**— Indicates if SSH is enabled or disabled on the switch.
- Spanning Tree— Indicates if RSTP or STP is enabled on the switch. The default setting is RSTP.
- **QoS**— Indicates is QoS is enabled or disabled on the switch.
- **LLDP**— Indicates if LLDP is enabled or disabled on the switch.
- **SFLOW**— Indicates is sFlow is enabled or disabled on the switch.
- **802.1x Port Authentication**— Indicates if 802.1x Port Authentication is enabled or disabled on the switch.
- **Remote Logging**— Indicates if the remote log is enabled or disabled on the switch.
- **IGMP Snooping**— Indicates if IGMP Snooping is enabled or disabled on the switch.

The Administration Options section displays the following information:

- **System Upgrade**— Select this field to upgrade your system software. See “Upgrading the Software” on page 51.
- **Reboot**— Select this field to reboot the switch. For instructions, see “Rebooting a Switch” on page 50.

Chapter 4

Setting Port Parameters

This chapter describes how to display and modify the port settings such as back pressure and flow control. In addition, it provides procedures to display and modify storm control settings.

This chapter contains the following sections:

- “Displaying the Port Parameters” on page 58
- “Changing the Port Settings” on page 62
- “Displaying the Storm Control Settings” on page 66
- “Modifying the Storm Control Settings” on page 68

For additional information about the port parameters and the storm control feature, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- Chapter 7: Port Parameters
- Chapter 8: Port Parameter Commands

Displaying the Port Parameters

The port numbering system in the AlliedWare Plus web browser interface is different from the port numbering system in the CLI. For an example of the port numbering equivalents for the first five ports, see Table 1.

Table 1. Port Numbering the Web versus the CLI

Web Port Numbering	CLI Port Numbering
port 1	port 1.0.1
port 2	port 1.0.2
port 3	port 1.0.3
port 4	port 1.0.4
port 5	port 1.0.5
port 5	port 1.0.6
port 7	port 1.0.7
port 8	port 1.0.8

Within the display, there is no differentiation between ports 25 through 28 and ports 25R through 28R. In the web interface, if you want to see if port 25 is connected versus port 25R, go to the home page and look at the illustration of the switch. For an example of the home page, see Figure 4 on page 23.

To display the settings for all of the switch ports, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19.

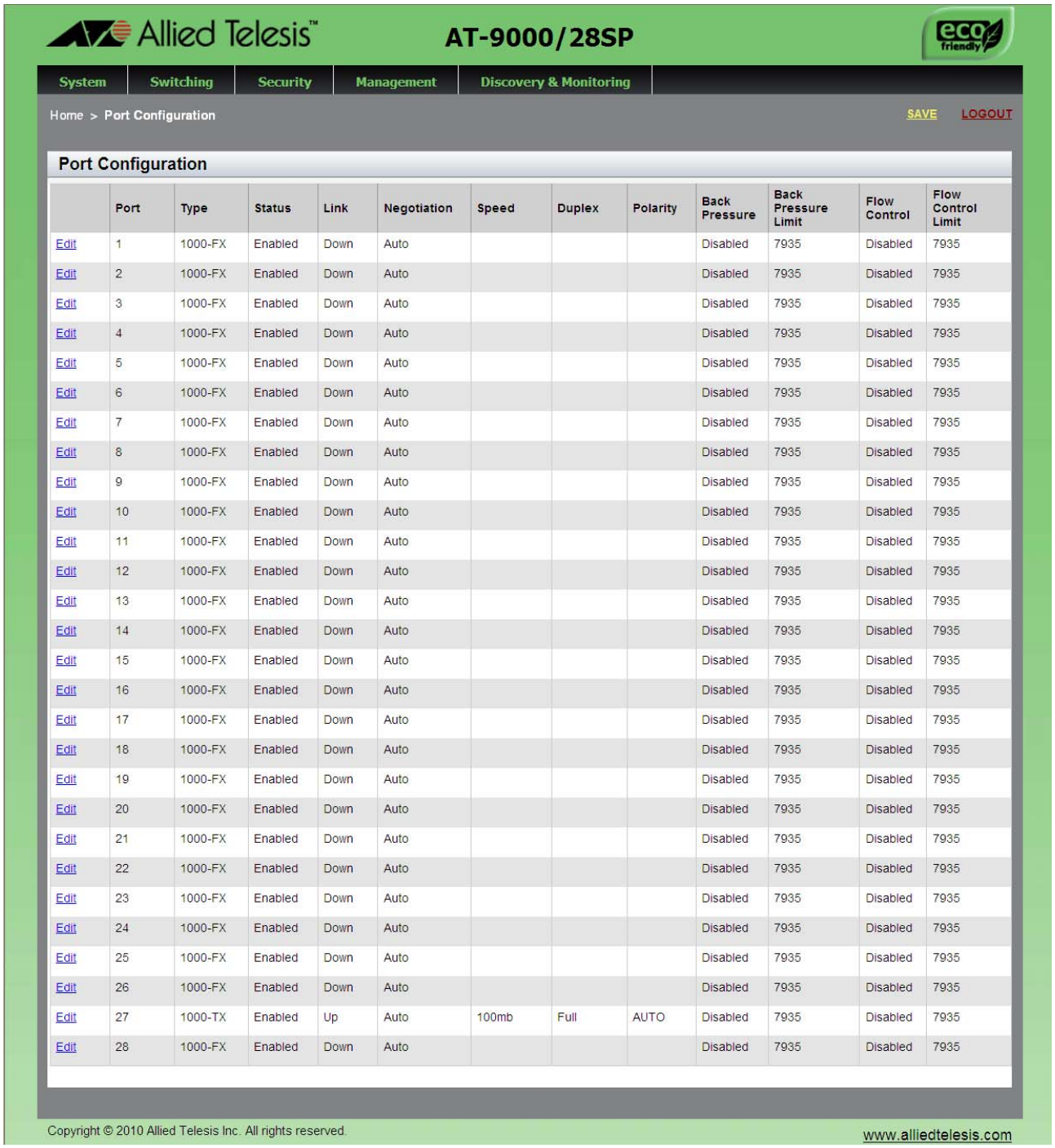
Figure 19. Switching Tab with Port Tab

2. From the Switching tab, select **Port**.

   The Port tab expands to the right.

3. From the Port tab, select **Port Configuration**.

   The Port Configuration page is displayed. See Figure 20.



	Port	Type	Status	Link	Negotiation	Speed	Duplex	Polarity	Back Pressure	Back Pressure Limit	Flow Control	Flow Control Limit
Edit	1	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	2	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	3	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	4	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	5	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	6	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	7	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	8	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	9	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	10	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	11	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	12	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	13	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	14	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	15	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	16	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	17	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	18	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	19	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	20	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	21	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	22	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	23	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	24	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	25	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	26	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935
Edit	27	1000-TX	Enabled	Up	Auto	100mb	Full	AUTO	Disabled	7935	Disabled	7935
Edit	28	1000-FX	Enabled	Down	Auto				Disabled	7935	Disabled	7935

Figure 20. Port Configuration Page

4. The following fields are displayed:

   - **Port**— Indicates the port number.
   - **Type**— Specifies the if the port is fiber, indicated by 1000-FX, or copper, indicated by 100-FX.
   - **Status**— Indicates if the port is enabled or disabled. The default setting is “Enabled.” Disabling ports turns off their receivers and transmitters so that they cannot forward traffic.
   - **Link**— Indicates the port has successfully connected to a port on another switch or unit.
   - **Negotiation**— Indicates Autonegotiation. By default, Autonegotiation is enabled.
   - **Speed**— Specifies the speed of the port. The default setting is “1000-FX” for 1000Mbps. The other possible options are “10” for 10Mbps and “100” for 100Mbps.
   - **Duplex**— Indicates the duplex mode of the twisted pair ports or Auto Negotiation. The three settings are half, full, and Auto Negotiation.
   - **Polarity**— Indicates the port’s wiring configuration is MDI (medium dependent interface) or MDI-X (medium dependent interface crossover). This setting only applies to a twisted pair port that is operating at 10 or 100 Mbps.

   Note
   You can enable or disable backpressure on ports where you disabled Auto-Negotiation and set the speeds and duplex modes manually to 10 or 100 Mbps in half-duplex mode.

   - **Back Pressure**— Indicates if back pressure is enabled or disabled on a port. Backpressure is used by ports during periods of packet congestion to temporarily stop their network counterparts from transmitting more packets. This prevents a buffer overrun and the subsequent loss and retransmission of network packets. A port initiates backpressure by transmitting on the shared link to cause a data collision, which causes its link partner to cease transmission. The default setting is “Disabled.”
   - **Back Pressure Limit**— Indicates the threshold level for back pressure on a port. Specifies the number of cells for back pressure. The default value is 7935 cells.
   - **Flow Control**— Indicates if flow control (send and receive) is enabled or disabled on a port. When flow control is enabled, a port sends pause packets when it reaches the point of packet congestion. Also, the port stops transmitting packets when it receives pause packets from its local or remote counterpart. When flow control is disabled, the port sends pause packet regardless of

packet congestion. In addition the port continues transmitting packets when it receives pause packets from its local or remote counterpart. The default is "Disabled."

- **Flow Control Limit**— Indicates the threshold level for flow control on a port. The default value is 7935.

Changing the Port Settings

You can change the settings of one port at a time. Use the following procedure to change the port settings or reset a port to its default value,

To change the port settings, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

   The Port tab expands to the right.

3. From the Port tab, select **Port Configuration**.

   The Port Configuration page is displayed. See Figure 20 on page 59.

4. Click Edit next to the port that you want to modify.

   The Port Configuration Modify page is displayed. See Figure 21 on page 63.

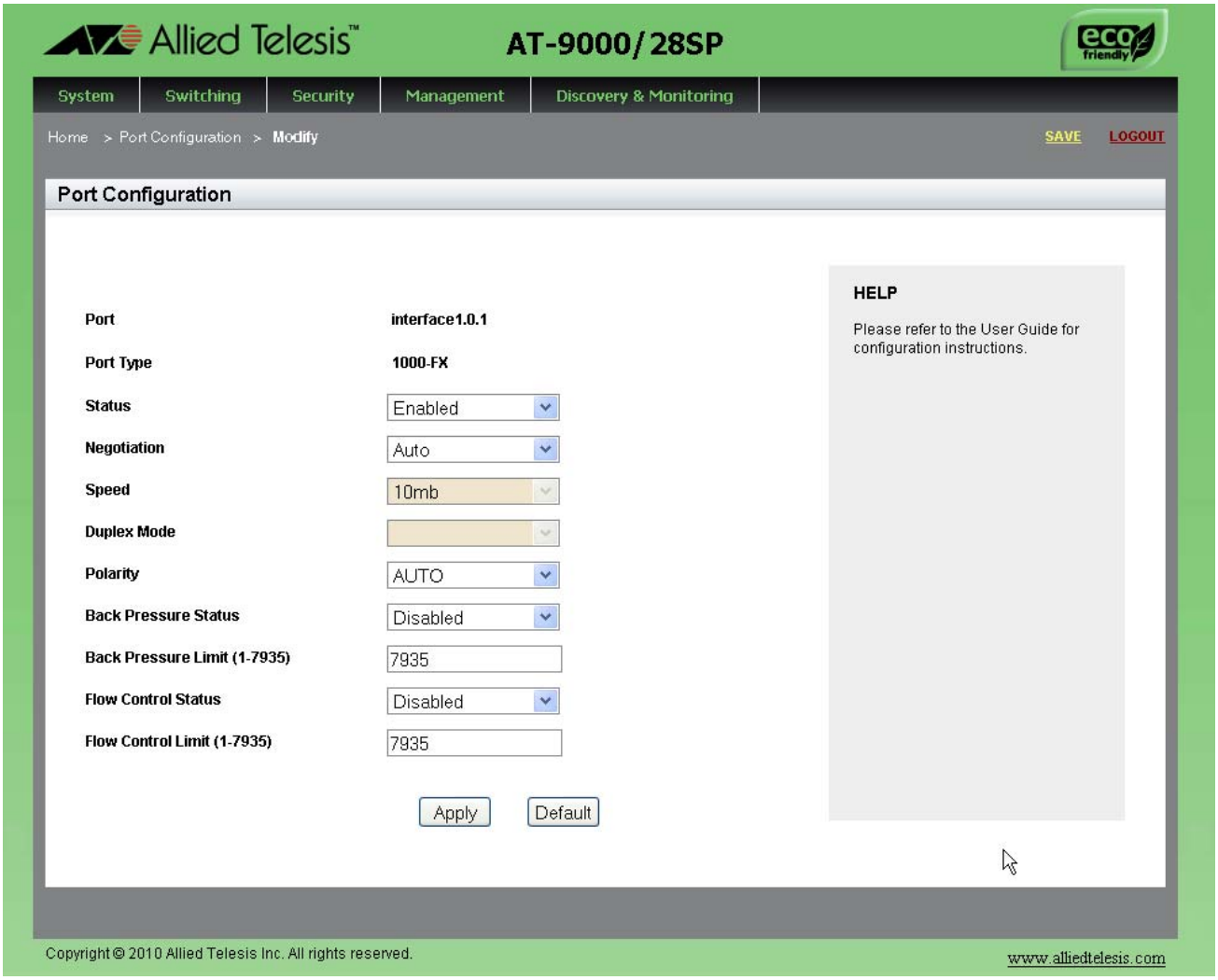


Figure 21. Port Configuration Modify Page

5. Configure the following parameters as needed:

   - **Port**— Indicates the port number.
   - **Port Type**— Indicates the type of port, fiber or copper. You cannot modify this field.
   - **Status**— Indicates if the port is enabled or disabled. Choose between "Enabled" or "Disabled." The default setting is "Enabled." Disabling ports turns off their receivers and transmitters so that they cannot forward traffic. You may want to disable a port if there is a problem with a cable or network device.
   - **Negotiation**— Indicates the state of Auto Negotiation on a port. Select "Auto" to enable Auto Negotiation on a port or "Manual" to disable Auto Negotiation. The default setting is Auto. When the setting for this field is "Auto," the Speed and Duplex fields change

from white to brown and you cannot select them. To change the Speed and Duplex Mode fields, change the Negotiation setting to “Manual.”

- **Speed**— Indicates the port speed. Select 10mb, 100mb, or 1000mb.
- **Duplex Mode**— Sets the set the duplex modes of the twisted pair ports or activates Auto-Negotiation manually. The settings are half, full, or Auto Negotiation. Ports operating in half-duplex mode can either receive or transmit packets, but not both at the same time. Ports operating in full-duplex can both send and receive packets, simultaneously.
- **Polarity**— Sets the wiring configuration of the twisted pair ports when they are operating at 10 or 100 Mbps, in either half- or full-duplex mode.

  A twisted pair port that is operating at 10 or 100 Mbps can have one of two wiring configurations. The configurations are known as MDI and MDI-X. To forward traffic, a port on the switch and a port on a network device must have different settings. For instance, the wiring configuration of a switch port has to be MDI if the wiring configuration on a port on a network device is MDIX.

  To set this parameter on a port, you must set the speed and duplex mode manually. A port that is using Auto-Negotiation sets its wiring configuration automatically using auto-MDI/MDIX.
- **Back Pressure Status**— Activates or deactivates back pressure on the ports. Use this field to enable or disable back pressure on ports that are operating at 10 or 100 Mbps in half-duplex mode. Back pressure is used by ports during periods of packet congestion to temporarily stop their network counterparts from transmitting more packets. This prevents a buffer overrun and the subsequent loss and retransmission of network packets. A port initiates back pressure by transmitting on the shared link to cause a data collision, which causes its link partner to cease transmission.

  To set back pressure on a port, you must configure the speed and duplex mode manually. You cannot set back pressure on a port that is using Auto-Negotiation.
- **Back Pressure Limit (1 - 7935)**— Indicates a threshold level for back pressure on a port. Specifies the number of cells for back pressure. A cell represents 128 bytes. The range is 1 to 7935 cells. The default value is 7935 cells.
- **Flow Control Status**— Enables or disables the flow control feature. By default, flow control is disabled on a port.

- **Flow Control Limit (1 - 7935)**— Indicates the threshold levels for flow control on the ports. Specifies the number of cells for flow control. A cell represents 128 bytes. The range is 1 to 7935 cells. The default value is 7935 cells.

6. To set the port to the default port value, click **Default**. Otherwise skip this step.
7. Click **Apply**.
8. Click **SAVE**.

Displaying the Storm Control Settings

To display the storm control settings, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

   The Port tab expands to the right.

3. From the Port tab, select **Storm Control**.

   The Storm Control List page is displayed. See Figure 22.

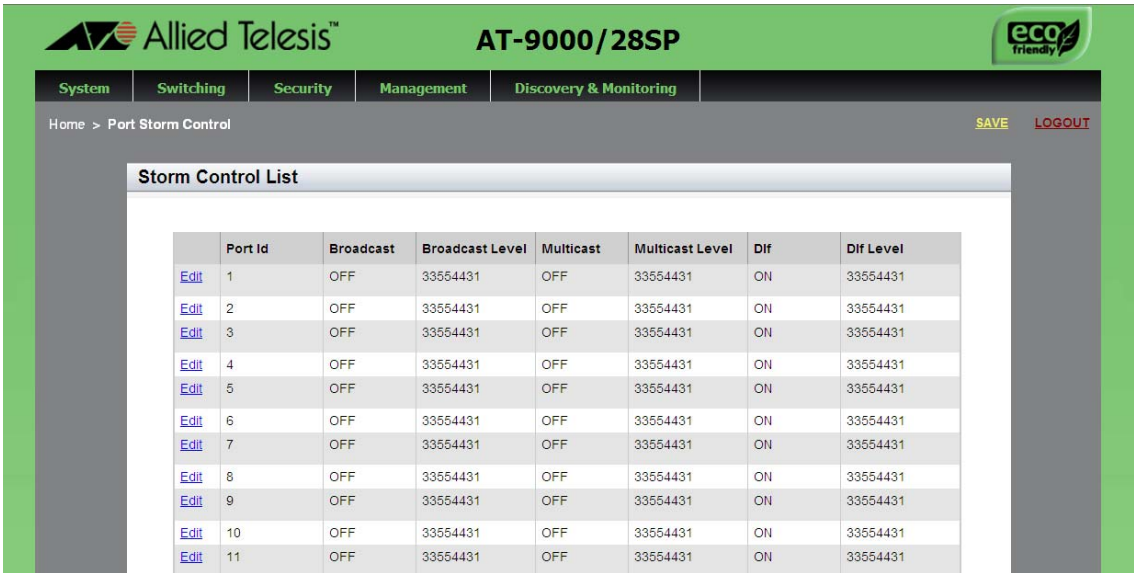


Figure 22. Storm Control List Page

The following fields are displayed:

- **Port Id**— Indicates the port number.
- **Broadcast**— Indicates Broadcast packets are received, indicated by “ON,” or not received, indicated by “OFF,” by the port. By default, Broadcast packets are not received by a port.
- **Broadcast Level**— Specifies the maximum number of ingress packets per second of broadcast packets the port will forward. The range is 0 to 33,554,431 packets. The default is 33,554,431 packets.
- **Multicast**— Indicates Multicast packets are “ON” or “OFF” on the port. By default, Multicast packets are not received by a port.

- **Multicast Level**— Specifies the maximum number of ingress packets per second of multicast packets the port will forward. The range is 0 to 33,554,431 packets. The default is 33,554,431 packets.
- **Dlf**— Indicates unknown unicast packets are "ON" or "OFF" on the port. By default, the setting is "ON" indicating that unknown unicast packets are received by a port.
- **Dlf Level**— Specifies the maximum number of ingress packets per second of unknown unicast packets the port forwards. The range is 0 to 33,554,431 packets. The default is 33,554,431 packets.

Modifying the Storm Control Settings

To modify the storm control settings, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

   The Port tab expands to the right.

3. From the Port tab, select **Storm Control**.

   The Storm Control List page is displayed. See Figure 20 on page 59.

4. Click Edit on the port that you want to modify.

   The Storm Control Settings page is displayed. See Figure 23.

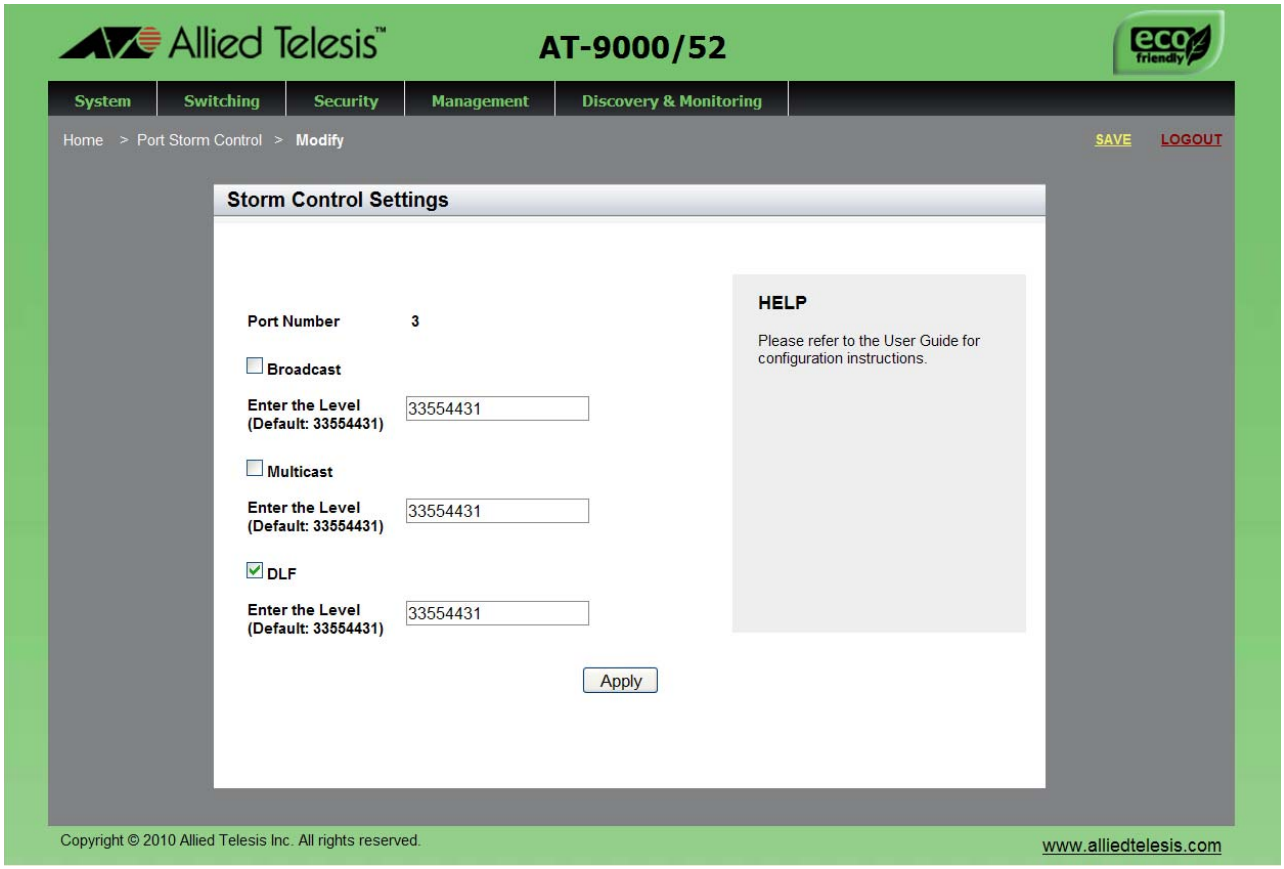


Figure 23. Storm Control Settings Page

5. Change the following fields as needed:

   - **Port Number**— Indicates the port number.
   - **Broadcast**— Indicates Broadcast packets are received, indicated by "ON," or not received, indicated by "OFF," by the port. By default, Broadcast packets are not received by a port.
   - **Broadcast Level**— Specifies the maximum number of ingress packets per second of broadcast packets the port will forward. The range is 0 to 33,554,431 packets. The default is 33,554,431 packets.
   - **Multicast**— Indicates Multicast packets are "ON" or "OFF" on the port. By default, this field is set to "OFF" which indicates Multicast packets are *not* received by a port.
   - **Multicast Level**— Specifies the maximum number of ingress packets per second of multicast packets the port forwards. The range is 0 to 33,554,431 packets. The default is 33,554,431 packets.
   - **DLF**— Indicates unknown unicast packets are "ON" or "OFF" on the port. By default, the setting is "ON" indicating that unknown unicast packets are received by a port.
   - **DLF Level**— Specifies the maximum number of ingress packets per second of unknown unicast packets the port forwards. The range is 0 to 33,554,431 packets. The default is 33,554,431 packets.

6. Click **Apply**.

7. Click **SAVE**.

Chapter 5

Setting Port Statistics

This chapter describes how to display and clear port statistics. Within the AlliedWare Plus software, you can display and clear transmit, receive, and interface port statistics.

This chapter contains the following topics:

- “Displaying Port Statistics” on page 72
- “Clearing Port Statistics” on page 79

For additional information about port statistics, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- Chapter 7: Port Parameters
- Chapter 8: Port Parameter Commands

Displaying Port Statistics

You can display several types of port statistics. See the following sections:

- ❒ “Displaying Transmit and Receive Port Statistics” on page 72
- ❒ “Displaying the Receive Statistics” on page 73
- ❒ “Displaying Transmit Statistics” on page 75
- ❒ “Displaying Interface Statistics” on page 77

Displaying Transmit and Receive Port Statistics

To display the transmit and receive statistics for all of the switch ports, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

3. Move the cursor to the right and select **Statistics**.

   The Port Statistics page is displayed with the Tx + Rx tab automatically selected. See Figure 24.

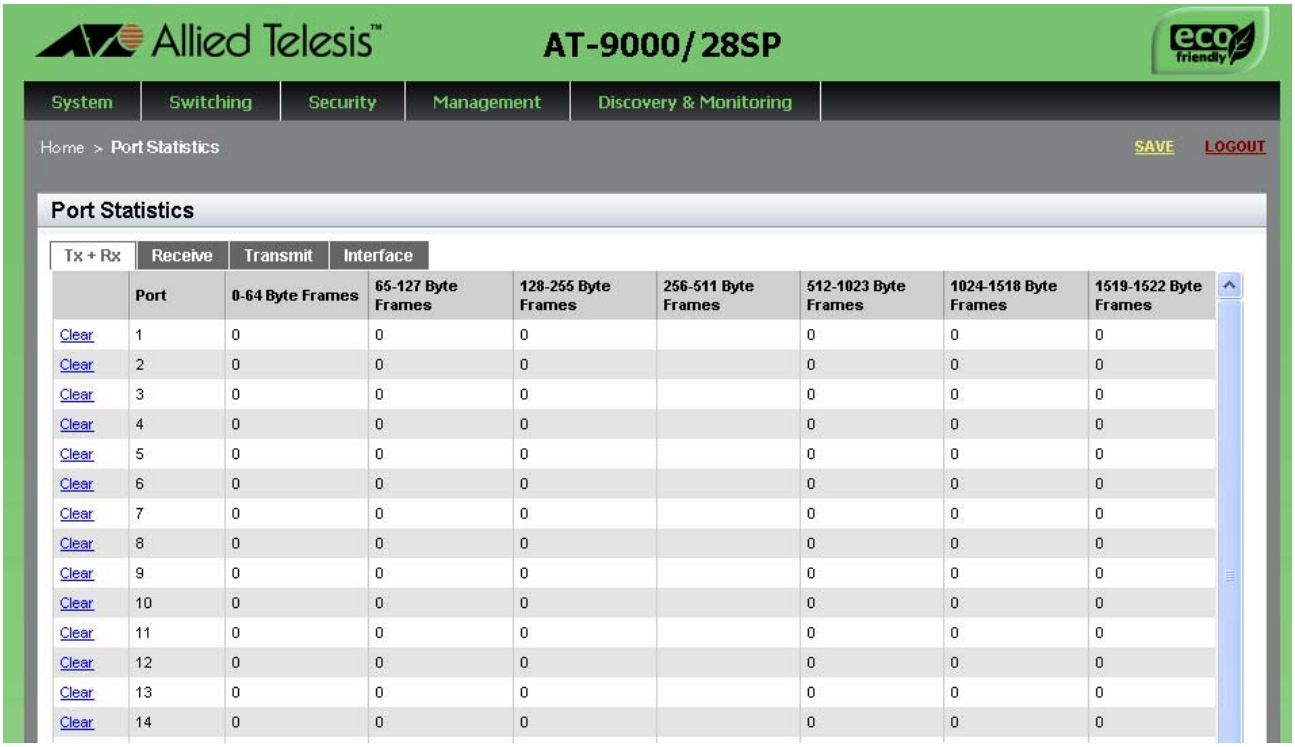


Figure 24. Port Statistics Page with Tx + Rx Tab

The following fields are displayed:

- **Port**— Indicates the port number.
- **0-64 Byte Frames**— The number of frames transmitted by the port that contain 0 to 64 bytes.
- **65-127 Byte Frames**— The number of frames transmitted by the port that contain 65 to 127 bytes.
- **128-255 Byte Frames**— The number of frames transmitted by the port that contain 128 to 255 bytes.
- **256-511 Byte Frames**— The number of frames transmitted by the port that contain 256 to 511 bytes.
- **512-1023 Byte Frames**—The number of frames transmitted by the port that contain 512 to 1023 bytes.
- **1024-1518 Byte Frames**— The number of frames transmitted by the port that contain 1024 to 1518 bytes.
- **1519-1522 Byte Frames**— The number of frames transmitted by the port that contain 1519 to 1522 bytes.

Displaying the Receive Statistics

To display the statistics on the Receive Statistics tab, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

3. Move the cursor to the right and select **Statistics**.

   The Port Statistics page with the Tx + Rx tab selected is displayed. See Figure 24 on page 72.

4. Click on the **Receive** Tab.

   The Port Statistics with the Receive tab selected is displayed. See Figure 25 on page 74.

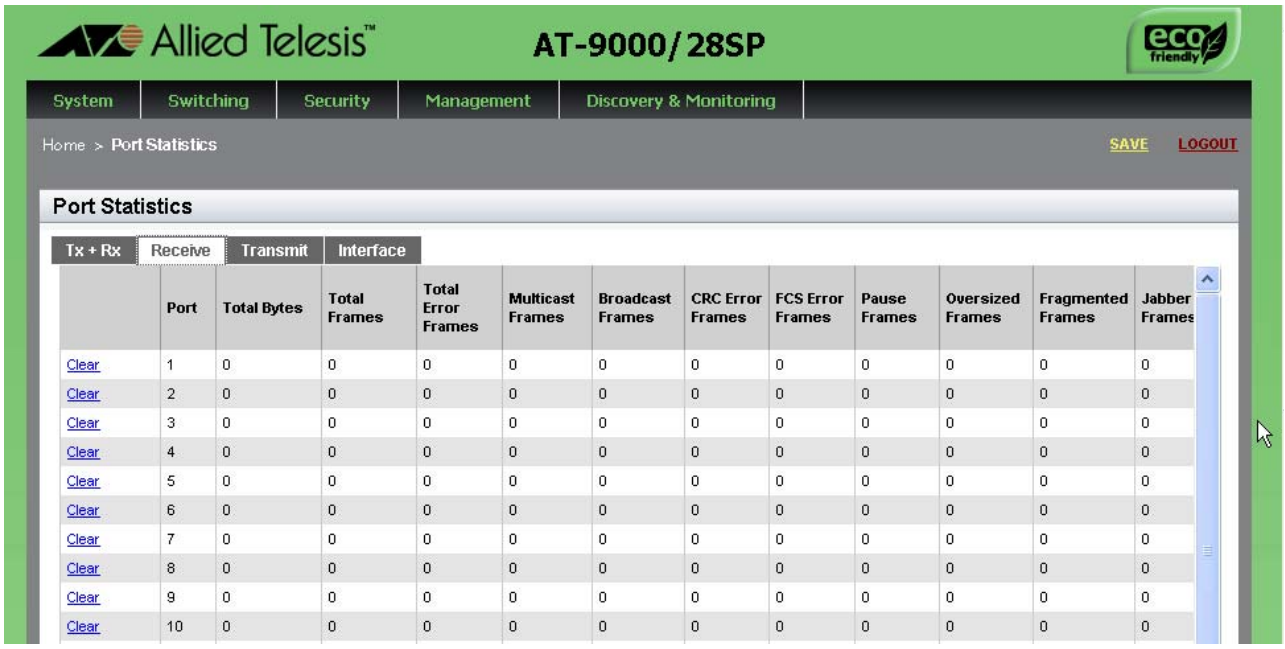


Figure 25. Port Statistics with the Receive Tab

The following fields are displayed:

- **Port**— Indicates the port number.
- **Total Bytes**— Indicates the number of received bytes.
- **Total Frames**— Indicates the number of received frames.
- **Total Error Frames**— Indicates the total number of received frames with errors.
- **Multicast Frames**— Indicates the number of received multicast frames.
- **Broadcast Frames**— Indicates the number of received broadcast frames.
- **CRC Frame Errors**— Indicates the number of frames with a cyclic redundancy check (CRC) error but with the proper length (64 - 1518 bytes) received by the port.
- **FSC Frame Errors**— Indicates the number of ingress frames that had frame check sequence (FCS) errors.
- **Pause Frames**— Indicates the number of received flow control pause frames.
- **Oversize Frames**— Indicates the number of received frames that exceeded the maximum size as specified by IEEE 802.3 (1518 bytes including the CRC).

- **Fragmented Frames**— Indicates the number of undersized frames, frames with alignment errors, and frames with frame check sequence (FCS) errors (CRC errors).
- **Jabber Frames**— Indicates the number of occurrences of corrupted data or useless signals the port has encountered.

Note
The following fields are not displayed in Figure 25 on page 74.

- **Undersize Frames**— Indicates the number of received frames that were less than the minimum length as specified by IEEE 802.3 (64 bytes including the CRC).
- **Dropped Frames**— Indicates the number of frames successfully received and buffered by the port, but discarded and not forwarded.
- **MTU Exceed Discarded Frames**— Indicates the number of received frames with an MTU that exceeds the MTU of the switch. These frames are discarded.
- **MAC Error Frames**— Indicates the number of Receive Error events seen by the receive side of the MAC.

Displaying Transmit Statistics

To display the statistics on the Transmit Statistics tab, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

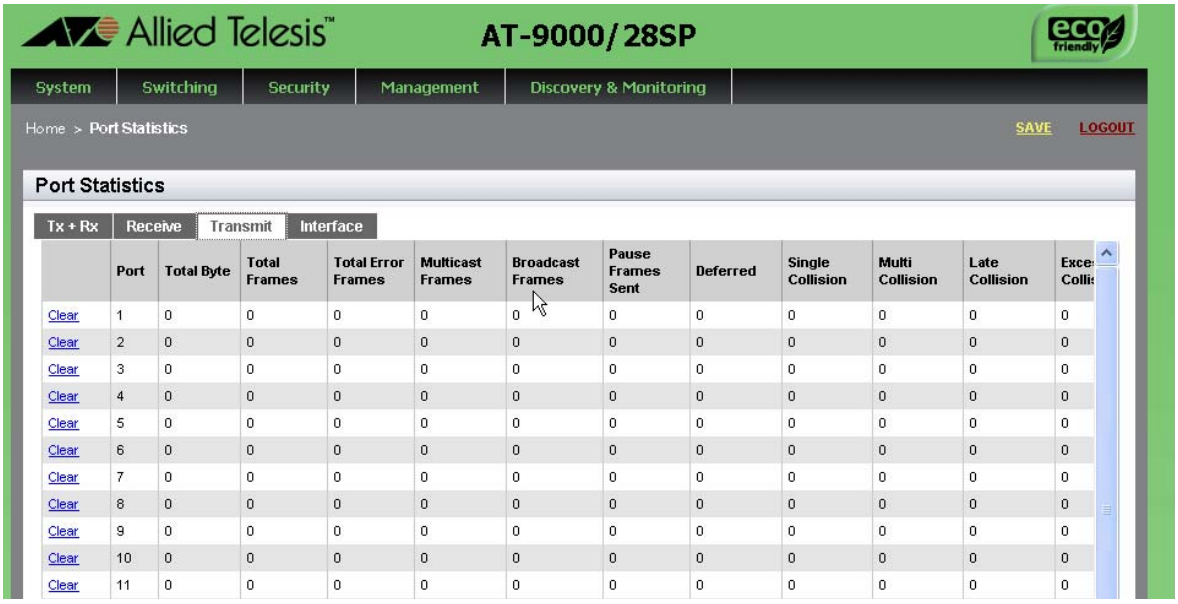
2. From the Switching tab, select **Port**.

3. Move the cursor to the right and select **Statistics**.

   The Port Statistics page with the Tx + Rx tab selected is displayed. See Figure 24 on page 72.

4. Click the **Transmit** tab.

The Port Statistics with the Transmit tab selected is displayed. See Figure 26.



	Port	Total Byte	Total Frames	Total Error Frames	Multicast Frames	Broadcast Frames	Pause Frames Sent	Deferred	Single Collision	Multi Collision	Late Collision	Exce Colli
Clear	1	0	0	0	0	0	0	0	0	0	0	0
Clear	2	0	0	0	0	0	0	0	0	0	0	0
Clear	3	0	0	0	0	0	0	0	0	0	0	0
Clear	4	0	0	0	0	0	0	0	0	0	0	0
Clear	5	0	0	0	0	0	0	0	0	0	0	0
Clear	6	0	0	0	0	0	0	0	0	0	0	0
Clear	7	0	0	0	0	0	0	0	0	0	0	0
Clear	8	0	0	0	0	0	0	0	0	0	0	0
Clear	9	0	0	0	0	0	0	0	0	0	0	0
Clear	10	0	0	0	0	0	0	0	0	0	0	0
Clear	11	0	0	0	0	0	0	0	0	0	0	0

Figure 26. Port Statistics with the Transmit Tab

The following fields are displayed:

- **Port**— Indicates the port number.
- **Total Bytes**— Indicates the number of transmitted bytes.
- **Total Frames**— Indicates the number of transmitted frames.
- **Total Error Frames**— Indicates the number of transmitted frames with errors.
- **Multicast Frames**— Indicates the number of transmitted multicast frames.
- **Broadcast Frames**— Indicates the number of transmitted broadcast frames.
- **Pause Frames Sent**— Indicates the number of transmitted flow control pause frames.
- **Deferred**— Indicates the number of egress frames that the port could not immediately transmit.
- **Single Collision**— Indicates the number of frames that were transmitted after at least one collision.
- **Multi Collision**— Indicates the number of frames that were transmitted after more than one collision.
- **Late Collision**— Indicates the number of late collisions.
- **Excessive Collision**— Indicates the number of excessive collisions.

- **Total Collision Frames**— Indicates the total number of collisions on the port.
- **MAC Error Frames**— Indicates the number of frames not transmitted correctly or dropped due to an internal MAC transmit error.

Displaying Interface Statistics

To display the interface statistics, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

3. Move the cursor to the right and select **Statistics**.

   The Port Statistics page with the Tx + Rx tab selected is displayed. See Figure 24 on page 72.

4. Click the **Interface** tab.

   The Port Statistics Page with the Interface tab selected is displayed. See Figure 27.

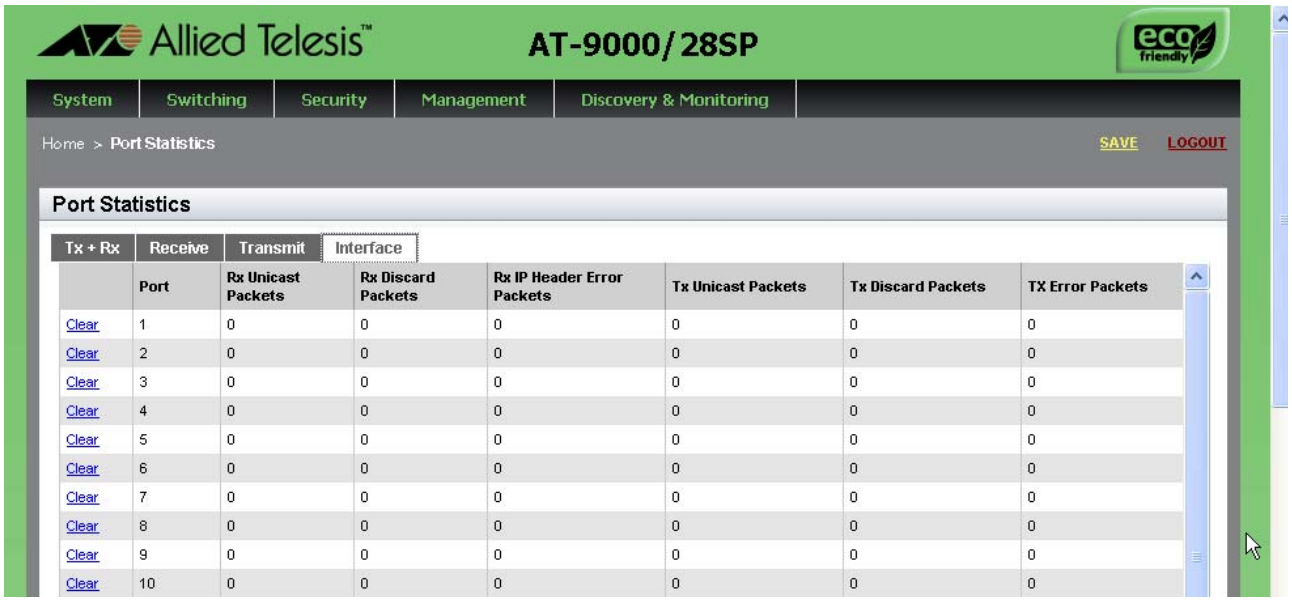


Figure 27. Port Statistics Page with Interface Tab

The following fields are displayed:

- **Port**— Indicates the port number.
- **Rx Unicast Packets**— Indicates the number of ingress unicast packets.

- **Rx Discard Packets**— Indicates the number of ingress packets that were discarded prior to transmission because of an error.
- **Rx IP Header Error Packets**— Indicates the number of ingress packets that were discarded because of a hardware error.
- **Tx Unicast Packets**— Indicates the number of egress unicast packets.
- **Tx Discard Packets**— Indicates the number of egress packets that were discarded prior to transmission because of an error.
- **Tx Error Packets**— Indicates the number of egress error packets.

Clearing Port Statistics

To clear the statistics for a port, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

3. Move the cursor to the right and select **Statistics**.

   The Port Statistics Page with Tx + Rx tab selected is displayed. See Figure 24 on page 72.

4. Select the desired Port Statistics tab. Choose from the following:

   - **Tx+Rx**— Displays the transmit and receive statistics. (This is the default.)
   - **Receive**— Displays the receive statistics.
   - **Transmit**— Displays the transmit statistics.
   - **Interface**— Displays the interface statistics.

5. Click **Clear** on the port that you want to clear.

Chapter 6

Setting Port Mirroring

The port mirror is a management tool that allows you to monitor the traffic on one or more ports on the switch. It works by copying the traffic from designated ports to another port where the traffic can be monitored with a network analyzer. The port mirror can be used to troubleshoot network problems or to investigate possible unauthorized network access. The performance and speed of the switch is not affected by the port mirror.

This chapter provides a brief description of the port mirroring feature and explains how to display and set port mirroring. See the following sections:

- ❒ “Overview” on page 82
- ❒ “Displaying Port Mirroring Settings” on page 83
- ❒ “Assigning a Destination Port” on page 85
- ❒ “Assigning Port Mirroring Values” on page 86

For more information about port mirroring, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 17: Port Mirror
- ❒ Chapter 18: Port Mirror Commands

Overview

To use the port mirroring feature, you must designate one or more source ports and one destination port. The source ports are the ports whose packets are mirrored and monitored. The destination port is the port where the packets from the source ports are copied and where the network analyzer is connected. There can be only one destination port on the switch.

Here are guidelines for setting the port mirroring feature:

- The switch supports only one port mirror.
- The port mirror can have one destination port.
- The port mirror can have more than one source port. This allows you to monitor the traffic on multiple ports at the same time. For example, you might monitor the traffic on all the ports of a particular VLAN.
- You can mirror the ingress traffic, the egress traffic, or both on the source ports.
- The destination port must not be a member of a static port trunk or an LACP trunk.

Displaying Port Mirroring Settings

To display the port mirroring assignments for all of the switch ports, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

   The Port tab is displayed.

3. From the Port tab, select **Mirroring**.

4. Move the cursor to the right and select **Mirroring**.

   The Port Mirroring List page is displayed. See Figure 28.

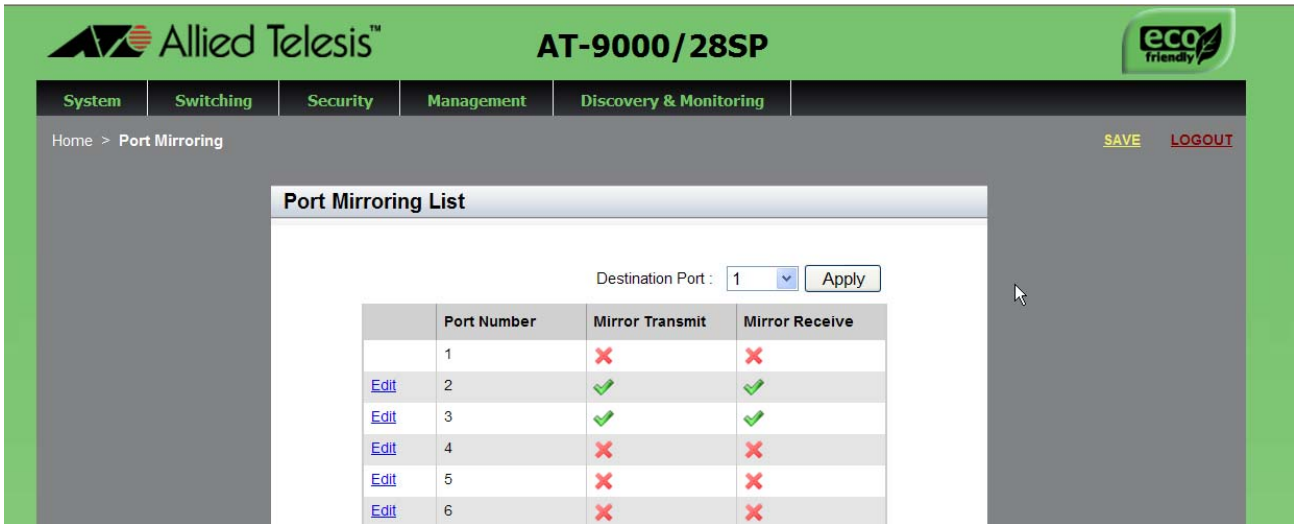


Figure 28. Port Mirroring List Page

The following fields are displayed:

- **Destination Port**— Specifies the port where the packets from the source ports are copied and where the network analyzer is connected. There can be only one destination port assigned to the switch. In Figure 28, the Destination Port is port 1.
- **Port Number**— Indicates the port number.
- **Mirror Transmit**— Indicates a source port whose transmitted, or egress, packets are mirrored and monitored. There can be multiple source ports on the switch.

- **Mirror Receive**— Indicates a source port whose received, or ingress, packets are mirrored and monitored. There can be multiple source ports on the switch.

Assigning a Destination Port

The destination port is the source port where the information from the mirror transmit and mirror receive ports is copied. You must assign the destination port before the mirror transmit and mirror receive ports. Also, you can only assign one destination port to the switch.

To assign a destination port, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

   The Port tab is displayed.

3. From the Port tab, select **Mirroring**.

   The Port Mirroring List page is displayed. See Figure 28 on page 83.

4. Select the pull-down menu next to the **Destination Port** field at the top of the page.

5. Click on the port that you want to designate as the destination port.

   You can only assign one destination port to a switch.

6. Click **Apply**.

   The **Edit** option is removed from the port. This indicates the destination port for the switch.

7. Click **SAVE**.

Assigning Port Mirroring Values

To assign mirrored ports and mirroring ports, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

   The Port tab is displayed.

3. From the Port tab, select **Mirroring**.

   The Port Mirroring List page is displayed. See Figure 28 on page 83.

4. Click Edit next to the port that you want to assign as a transmitting or receiving port mirror.

   Note
   You cannot select the destination port.

   The Modify Port Mirroring Page is displayed. See Figure 29

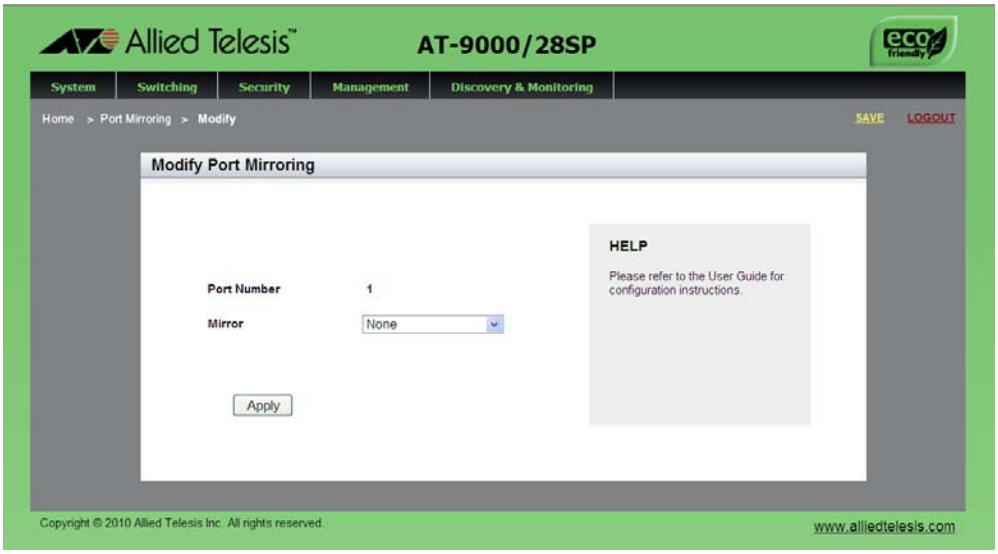


Figure 29. Modify Port Mirroring Page

Note
The **Port Number** field indicates the port number.

5. Select the type of mirroring for the port. The choices are:

   - **None**— Specifies the port is not a source port.
   - **Send**— Specifies the port is a transmitting, or egress, source port.
   - **Receive**— Specifies the port is a receiving, or ingress, source port.
   - **Both**— Specifies the port is both a transmitting and a receiving source port.

   By default, there is no mirror port assigned.

6. Click **Apply**.

7. Click **SAVE**.

Chapter 7

Setting the Port Spanning Tree Protocol

The Spanning Tree Protocol (STP) and the Rapid Spanning Tree Protocol (RSTP) guard against the formation of loops in an Ethernet network topology. A topology has a loop when two or more nodes can transmit packets to each other over more than one data path. Packets can become caught in repeating cycles, referred to as broadcast storms, that needlessly consume network bandwidth and that can significantly reduce network performance.

This chapter provides a brief description of the spanning tree protocols and explains how to set spanning tree on a port. See the following sections:

- ❒ “Overview” on page 90
- ❒ “Displaying Port Spanning Tree Protocol Settings” on page 91
- ❒ “Modifying Port Spanning Tree Protocol Settings” on page 93

Note
For information about how to set a spanning tree protocol for the switch, see Chapter 12, “Setting Switch Spanning Tree Protocols” on page 135.

For more information about the spanning tree protocols, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 35: Spanning Tree and Rapid Spanning Tree Protocols
- ❒ Chapter 36: Spanning Tree Protocol (STP)
- ❒ Chapter 37: STP Commands
- ❒ Chapter 38: Rapid Spanning Tree Protocol (RSTP)
- ❒ Chapter 39: RSTP Commands

Overview

STP and RSTP prevent loops from forming by ensuring that only one path exists between the end nodes in your network. Where multiple paths exist, these protocols place the extra paths in a standby or blocking mode. In addition, STP and RSTP can activate redundant paths if primary paths go down. These protocols guard against multiple links between segments and the risk of broadcast storms and maintain network connectivity by activating backup redundant paths.

One of the primary differences between the two protocols is in the time each takes to complete the process referred to as convergence. When a change is made to the network topology, such as the addition of a new bridge, a spanning tree protocol determines whether there are redundant paths that must be blocked to prevent data loops, or activated to maintain communications between the various network segments. This is the process of convergence.

With STP, convergence can take up to a minute to complete in a large network. This can result in the loss of communication between various parts of the network during the convergence process, and the subsequent lost of data packets.

RSTP is much faster than STP. It can complete a convergence in seconds, and so greatly diminish the possible impact the process can have on your network. Only one spanning tree can be active on the switch at a time. The default setting is RSTP.

Displaying Port Spanning Tree Protocol Settings

To display the Spanning Tree Protocol settings for all of the switch ports, do the following:

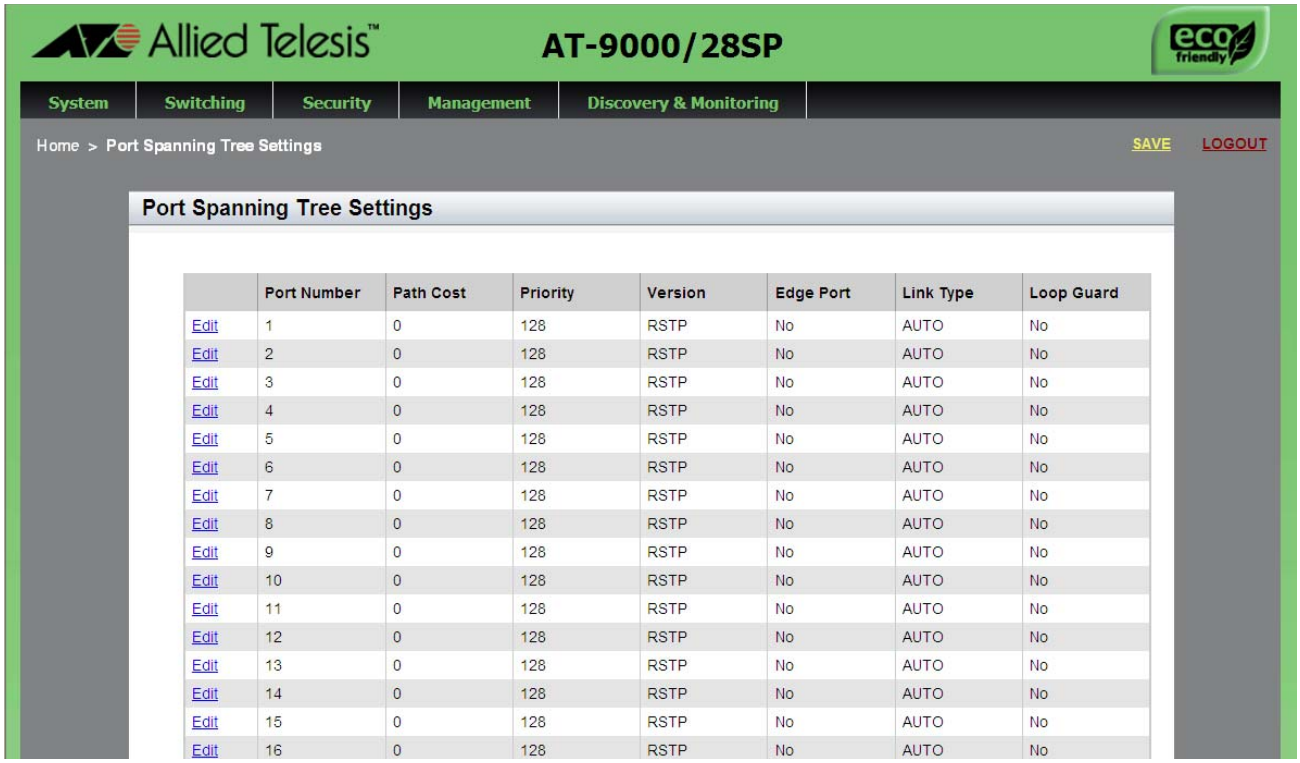
1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

3. Move the cursor to the right and select **Spanning Tree**.

   The Port Spanning Tree Settings page is displayed. See Figure 30.



	Port Number	Path Cost	Priority	Version	Edge Port	Link Type	Loop Guard
Edit	1	0	128	RSTP	No	AUTO	No
Edit	2	0	128	RSTP	No	AUTO	No
Edit	3	0	128	RSTP	No	AUTO	No
Edit	4	0	128	RSTP	No	AUTO	No
Edit	5	0	128	RSTP	No	AUTO	No
Edit	6	0	128	RSTP	No	AUTO	No
Edit	7	0	128	RSTP	No	AUTO	No
Edit	8	0	128	RSTP	No	AUTO	No
Edit	9	0	128	RSTP	No	AUTO	No
Edit	10	0	128	RSTP	No	AUTO	No
Edit	11	0	128	RSTP	No	AUTO	No
Edit	12	0	128	RSTP	No	AUTO	No
Edit	13	0	128	RSTP	No	AUTO	No
Edit	14	0	128	RSTP	No	AUTO	No
Edit	15	0	128	RSTP	No	AUTO	No
Edit	16	0	128	RSTP	No	AUTO	No

Figure 30. Port Spanning Tree Settings Page

The following fields are displayed:

- **Port Number**— Indicates the port number.
- **Path Cost**— Indicates the cost of a port to the root bridge. This cost is combined with the costs of the other ports in the path to the root bridge, to determine the total path cost. The lower the numeric value, the higher the priority of the path. The range is 6 to 40.
- **Priority (0-15)**— Indicates a bridge priority number for the switch. The device with the lowest priority number in the spanning tree

domain becomes the root bridge. If two or more devices have the same priority value, the device with the numerically lowest MAC address becomes the root bridge.

- **Version**— Indicates the Spanning Tree Protocol version. Choose from STP or RSTP. The default setting is RSTP.
- **Edge Port**— Indicates edge ports on the switch. Edge ports are not connected to spanning tree devices or to LANs that have spanning tree devices. As a consequence, edge ports do not receive BPDUs. If an edge port starts to receive BPDUs, it is no longer considered an edge port by the switch.
- **Link Type**— Designates point-to-point ports and shared ports.
- **Loop Guard**— Indicates the BPDU loop-guard feature on the ports is enabled (ON) or disabled (OFF). If a port that has this feature activated stops receiving BPDU packets, the switch automatically disables it. A port that has been disabled by the feature remains in that state until it begins to receive BPDU packets again or the switch is reset. The default setting for BPDU loop-guard on the ports is disabled.

Modifying Port Spanning Tree Protocol Settings

To modify port settings for Spanning Tree Protocol, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Port**.

3. Move the cursor to the right and select **Spanning Tree**.

   The Port Spanning Tree page is displayed. See Figure 30 on page 91.

4. Click Edit on the port that you want to change.

   The Modify Port Spanning Tree Settings page is displayed. See Figure 31.

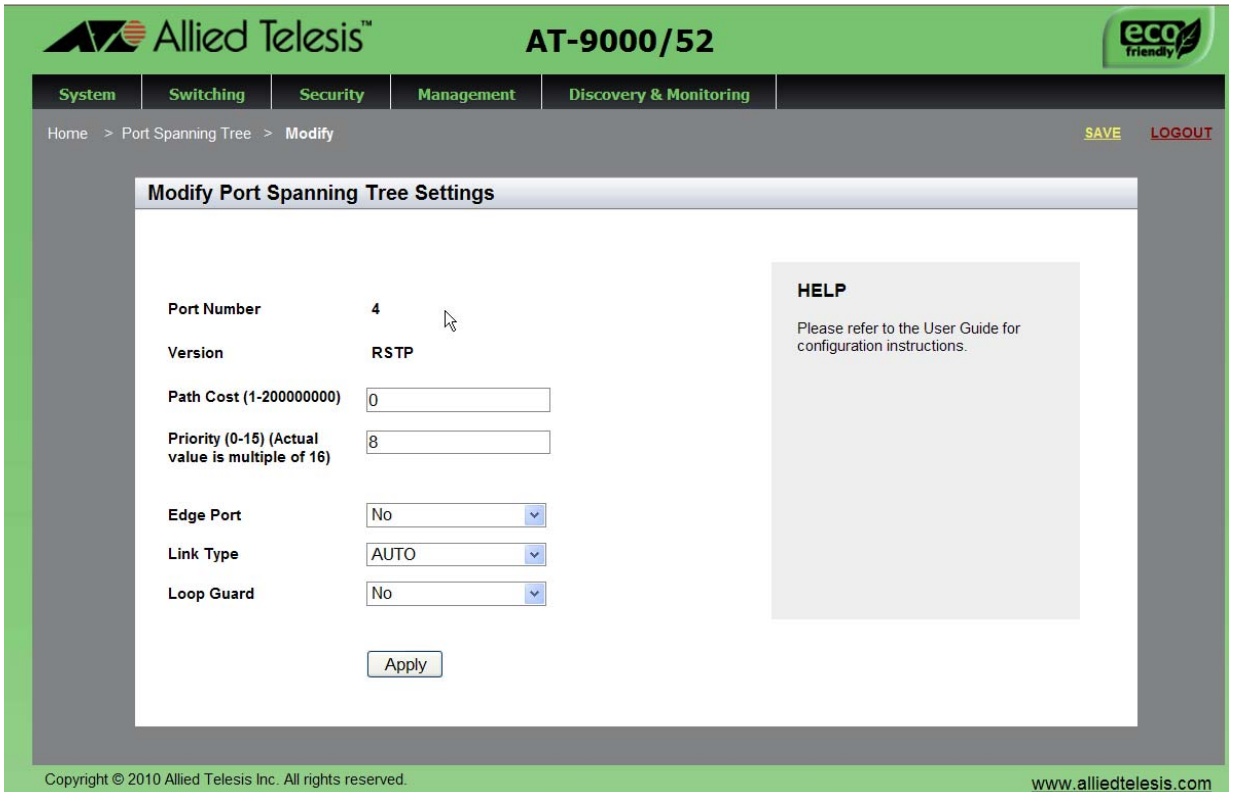


Figure 31. Modify Port Spanning Tree Settings Page

5. Change the following settings as needed:

   - **Port Number**— Indicates the port number.
   - **Version**— Indicates the Spanning Tree Protocol version. The default setting is RSTP.

- **Path Cost (1-200000000)**— Use this field to specify the cost of a port to the root bridge. This cost is combined with the costs of the other ports in the path to the root bridge, to determine the total path cost. The lower the numeric value, the higher the priority of the path. The range is 6 to 40.
- **Priority (0-15) (Actual value is multiple of 16)**— Indicates a bridge priority number for the switch. The device with the lowest priority number in the spanning tree domain becomes the root bridge. If two or more devices have the same priority value, the device with the numerically lowest MAC address becomes the root bridge.
- **Edge Port**— Designates the edge ports on the switch. Choose "Yes" to active an edge type or "No" to make an edge port inactive. Edge ports are not connected to spanning tree devices or to LANs that have spanning tree devices. As a consequence, edge ports do not receive BPDUs. If an edge port starts to receive BPDUs, it is no longer considered an edge port by the switch.
- **Link Type**— Choose from the following settings:

AUTO	If a port is set to full-duplex mode, AUTO indicates the Link Type is point-to-point. If a port is set to half-duplex mode, AUTO indicates the Link Type is shared.
PTP (point-to-point)	Allows for rapid transition of a port to the forwarding state during the convergence process of the spanning tree domain.
Shared	Disables rapid transition of a port. You may want to set thelink type to shared if a port is connected to a hub with multiple switches connected to it.

- **Loop Guard**— Indicates the BPDU loop-guard feature on the ports is enabled (ON) or disabled (OFF). If a port with the loop guard activated stops receiving BPDU packets, the switch automatically disables the port. A port that has been disabled by the feature remains in that state until it begins to receive BPDU packets again or the switch is reset. The default setting for BPDU loop-guard on the ports is disabled.

6. Click **Apply**.
7. Click **SAVE**.

Chapter 8

Setting the MAC Address

The procedures in this chapter describe how to display the MAC address table that resides on the switch as well as how to add an unicast or multicast MAC addresses to the table. Procedures to modify and delete MAC addresses within the table are also included in this chapter.

See the following sections:

- ❒ “Displaying the MAC Address” on page 96
- ❒ “Assigning a MAC Address” on page 99
- ❒ “Deleting a MAC Address” on page 102

For more information about MAC addresses, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 13: MAC Address Table
- ❒ Chapter 14: MAC Address Table Commands

Displaying the MAC Address

You can display both the unicast and multicast addresses in the MAC address table. See the following procedures:

- ❒ “Displaying the Unicast MAC Addresses” on page 96
- ❒ “Assigning a MAC Address” on page 99

Displaying the Unicast MAC Addresses

To display the unicast MAC addresses, do the following:

1. Select the Switching Tab.

   The Switching Tab is displayed. See Figure 32.

Figure 32. Switching Tab

2. Select **Mac Table** and then move the cursor to the right to select **Unicast**.

   The Unicast MACs page is displayed. See Figure 33 on page 97.

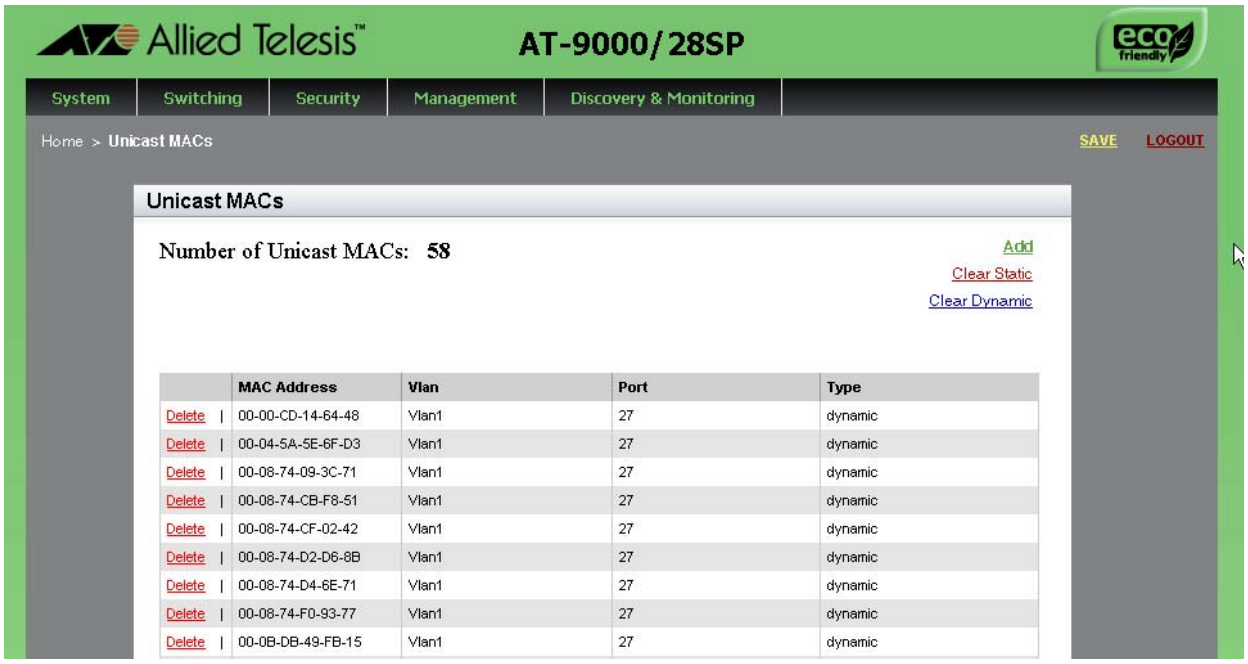


Figure 33. Unicast MACs Page

The following fields are displayed:

- **MAC Address**— Indicates the dynamic or static unicast MAC address learned on or assigned to the port.
- **Vlan**— The ID number of the VLAN where the node designated by the MAC address is a member. The default VLAN is Vlan1.
- **Port**— Indicates the port where the address was learned or assigned.
- **Type**— Indicates the type of MAC address, static or dynamic.

Displaying Multicast Addresses

To display the multicast addresses in the MAC address table, do the following:

1. Select the Switching tab.

   The Switching tab is displayed. See Figure 32 on page 96.

2. Select **Mac Table** and then move the cursor to the right to select **Multicast**.

   The Multicast MACs Page is displayed. See Figure 34 on page 98.

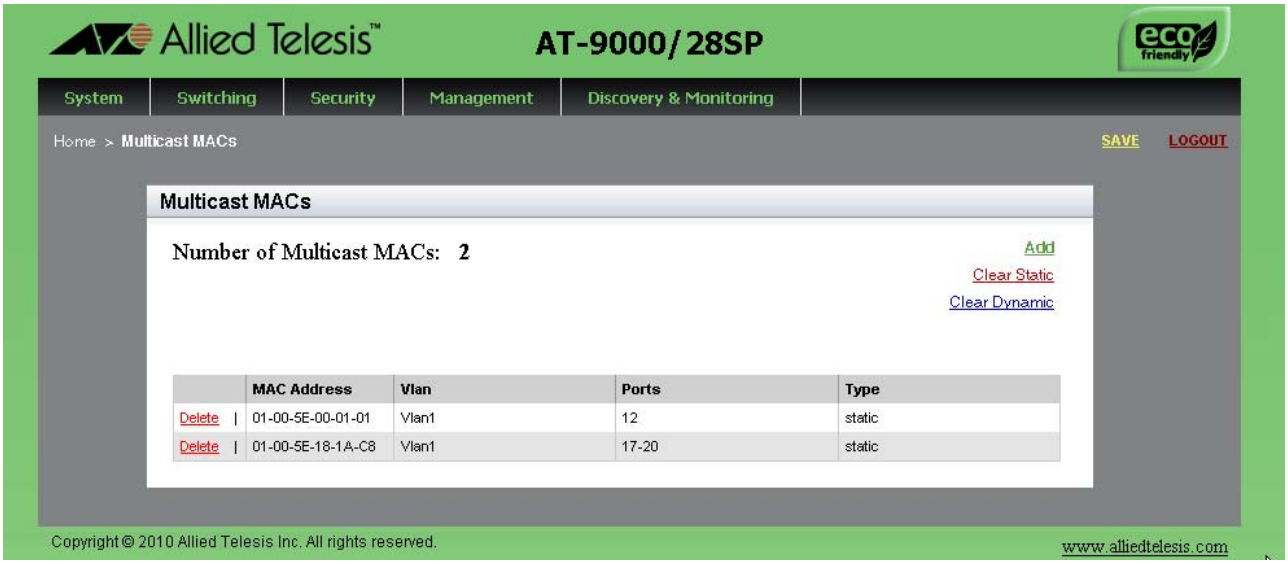


Figure 34. Multicast MACs Page

The following fields are displayed:

- **MAC Address**— Indicates the dynamic or static unicast MAC address learned on or assigned to the port.
- **Vlan**— Specifies the ID number of the VLAN where the multicast application and the host nodes are members. The default VLAN is Vlan1.
- **Port**— Indicates the port where the address was learned or assigned.
- **Type**— Indicates the type of MAC address: static or dynamic.

Assigning a MAC Address

You can assign a new unicast or multicast MAC address to the MAC address table. See the following procedures:

- ❒ "Assigning an Unicast Address" on page 99
- ❒ "Assigning a Multicast Address" on page 100

Assigning an Unicast Address

To assign an unicast MAC address to the MAC address table, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. Select **Mac Table** and then move the cursor to the right to select **Unicast**.

   The Unicast MACs page is displayed. See Figure 33 on page 97.

3. Click Add.

   The Unicast MAC Page is displayed. See Figure 35

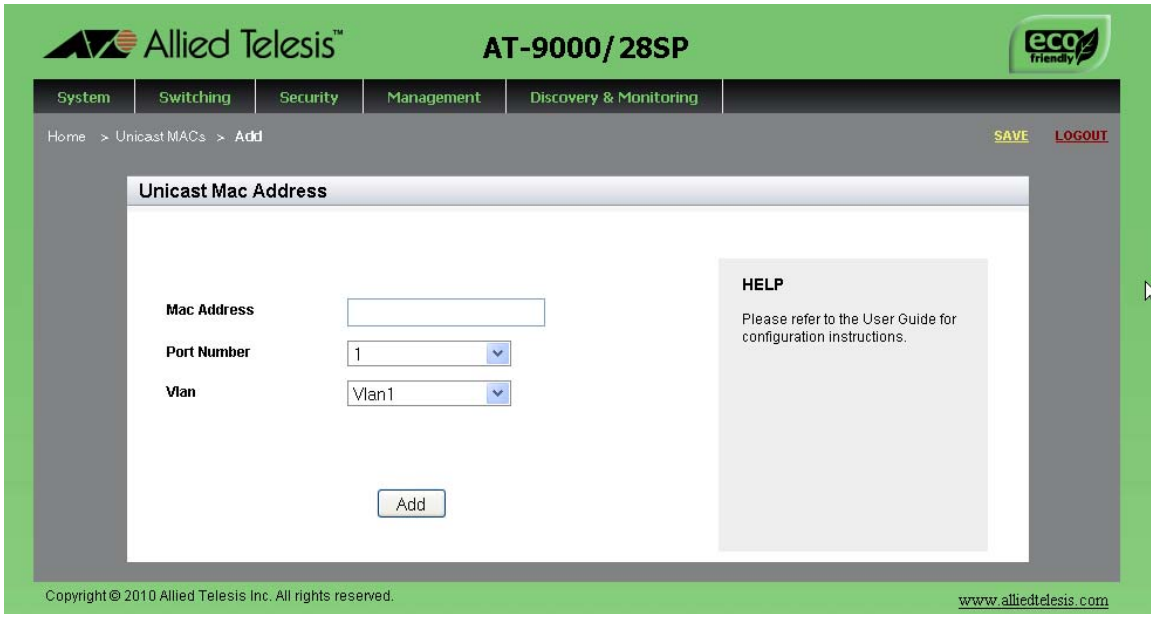


Figure 35. Unicast MAC Page

4. Enter a unicast MAC address in the **Mac Address** field. Use the following format: xx:xx:xx:xx:xx:xx

5. Select a port number with the **Port Number** pull-down menu.

   You can only assign one port number to a unicast MAC address.

6. Select a VLAN with the **Vlan** pull-down menu.

   For a unicast address, this field specifies the name of the VLAN where the node designated by the MAC address is a member.

7. Click **Add**.

8. Click **SAVE**.

Assigning a Multicast Address

To assign an multicast MAC address to the MAC address table, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. Select **Mac Table** and then move the cursor to the right to select **Multicast**.

   The Multicast MACs Page is displayed. See Figure 34 on page 98.

3. Click **Add**.

   The Multicast Mac Address Page is displayed. See Figure 36.

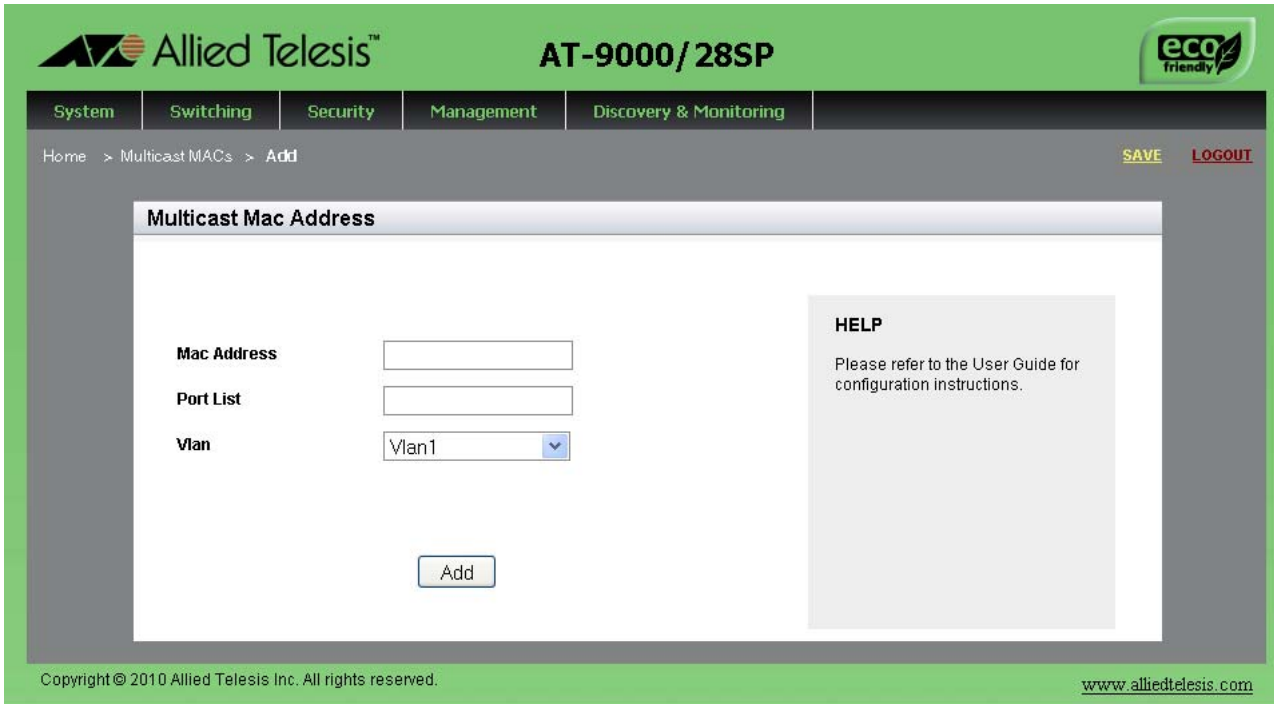


Figure 36. Multicast Mac Address Page

4. To assign a MAC Address, enter a multicast MAC address in the Mac Address field. Use the following format: xx:xx:xx:xx:xx:xx

5. Select a port list with the **Port List** pull-down menu.

   For a multicast address, you can assign more than one port number. Enter multiple ports separated by commas. Or, enter a range of ports separated by a dash.

6. Select a VLAN with the **Vlan** pull-down menu.

   For a multicast address, this field specifies the name of the VLAN where the node designated by the MAC address is a member.

7. Click **Add**.

8. Click **SAVE**.

Deleting a MAC Address

To delete a MAC address from the MAC address table, see the following procedures:

- “Deleting a Unicast Address” on page 102
- “Deleting a Multicast Address” on page 102

Deleting a Unicast Address

To delete a unicast address or clear all static or dynamic unicast addresses, do the following:

1. Select the Switching tab.

   The Switching tab is displayed. See Figure 32 on page 96.

2. Select **Mac Table** and then move the cursor to the right to select **Unicast**.

   The Unicast MACs page is displayed. See Figure 33 on page 97.

3. Do one of the following:

   - To clear all of the static unicast addresses in the MAC address table, click Clear Static.
   - To clear the dynamic unicast addresses in the MAC address table, click Clear Dynamic.
   - To delete a specific MAC address, click Delete next to the MAC address that you want to delete.

Deleting a Multicast Address

To delete a multicast address or clear all static or dynamic multicast addresses, do the following:

1. Select the Switching Tab.

   The Switching Tab is displayed. See Figure 32 on page 96.

2. Select **Mac Table** and then move the cursor to the right to select **Multicast**.

   The Multicast MACs page is displayed. See Figure 34 on page 98.

3. Do one of the following:

   - To clear all of the static multicast addresses in the MAC address table, click Clear Static.
   - To clear all of the dynamic multicast addresses in the MAC address table, click Clear Dynamic.

- To delete a specific MAC address, click Delete next to the MAC address that you want to delete.

Chapter 9

Setting LACP

The Link Aggregation Control Protocol (LACP) is used to increase the bandwidth between the switch and other LACP-compatible devices by grouping ports together to form single virtual links.

This chapter provides a brief description of LACP and explains how to display and set LACP. See the following sections:

- ❒ “Overview” on page 106
- ❒ “Displaying LACP Trunks” on page 107
- ❒ “Adding an LACP Trunk” on page 109
- ❒ “Modifying an LACP Trunk” on page 111
- ❒ “Deleting an LACP Trunk” on page 113

For more information about LACP trunks, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 33: Link Aggregation Control Protocol (LACP)
- ❒ Chapter 34: LACP Commands

Overview

LACP trunks are similar in function to static port trunks, but they are more flexible. The implementations of static trunks tend to be vendor specific and so may not always be compatible. In contrast, the implementation of LACP in the switch is compliant with the IEEE 802.3ad standard. It is interoperable with equipment from other vendors that also comply with the standard. This makes it possible to create LACP trunks between the switch and network devices from other manufacturers.

The main component of an LACP trunk is an aggregator. An aggregator is a group of ports on the switch. The ports of an aggregator are further grouped into a trunk, referred to as an aggregate trunk. An aggregator can have only one trunk. You have to create a separate aggregator for each trunk on the switch.

An aggregate trunk can consist of any number of ports on the switch, but only a maximum of eight ports can be active at a time. If an aggregate trunk contains more ports than can be active at one time, the extra ports are placed in standby mode. Ports in standby mode do not pass network traffic, but they do transmit and accept LACP data unit (LACPDU) packets, which the switch uses to search for LACP-compliant devices.

Displaying LACP Trunks

To display the LACP trunk assignments for all of the switch ports, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation selection, see Figure 37.

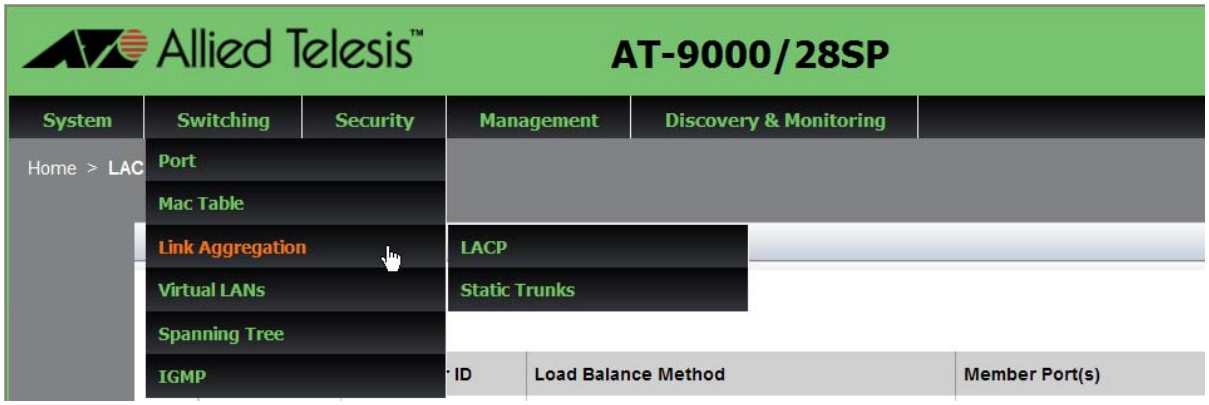


Figure 37. Switching Tab with Link Aggregation Selected

3. Move the cursor to the right and select **LACP**.

   The LACP Trunks page is displayed. See Figure 38.

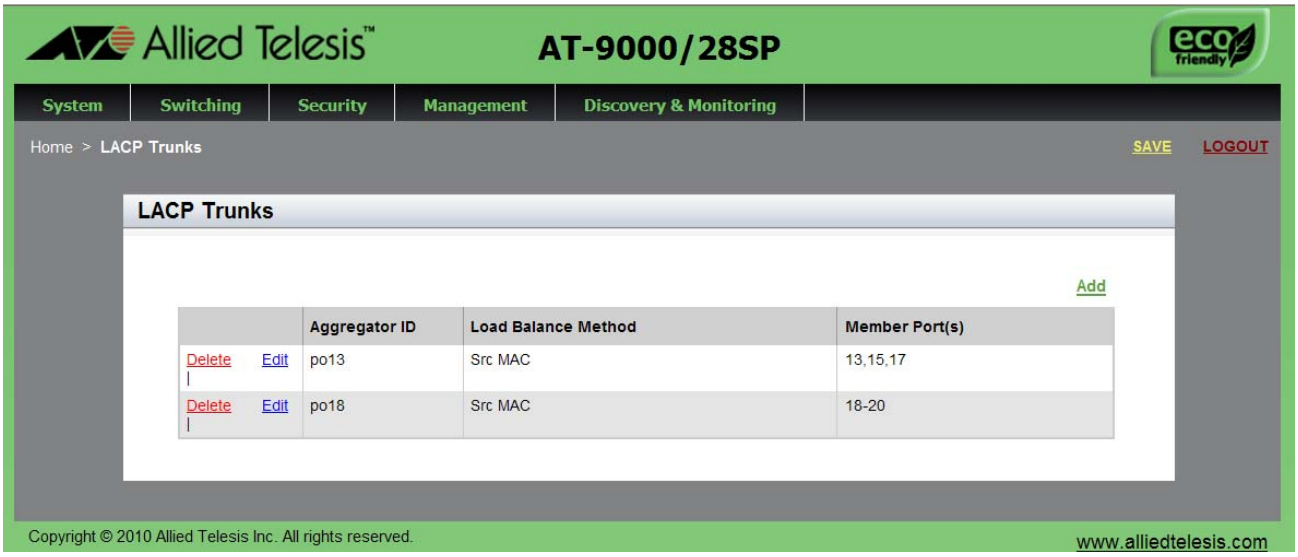


Figure 38. LACP Trunks Page

4. The following fields are displayed:

- **Aggregator ID**— Each aggregator must have an ID number. The ID number is the base port number (or lowest number) of an aggregator. For instance, an aggregator of ports 12,16 and 17 must be assigned the ID number 12 because that is the base port.
- **Load Balance Method**— Indicates the load distribution methods of the aggregators. An aggregator can have only one load distribution method. The load distribution method determines the manner in which the switch distributes the egress packets among the active ports of an aggregator. The packets can be distributed by source MAC or IP address, destination MAC or IP address, or by both source and destination addresses.
- **Member Port(s)**— Displays the member ports of the aggregators.

Adding an LACP Trunk

To create an LACP trunk, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation selection, see Figure 37 on page 107.

3. Move the cursor to the right and select **LACP**.

   The LACP Trunks page is displayed. See Figure 38 on page 107.

4. From the LACP Trunks page, click Add.

   The Add LACP Trunk page is displayed. See Figure 39.

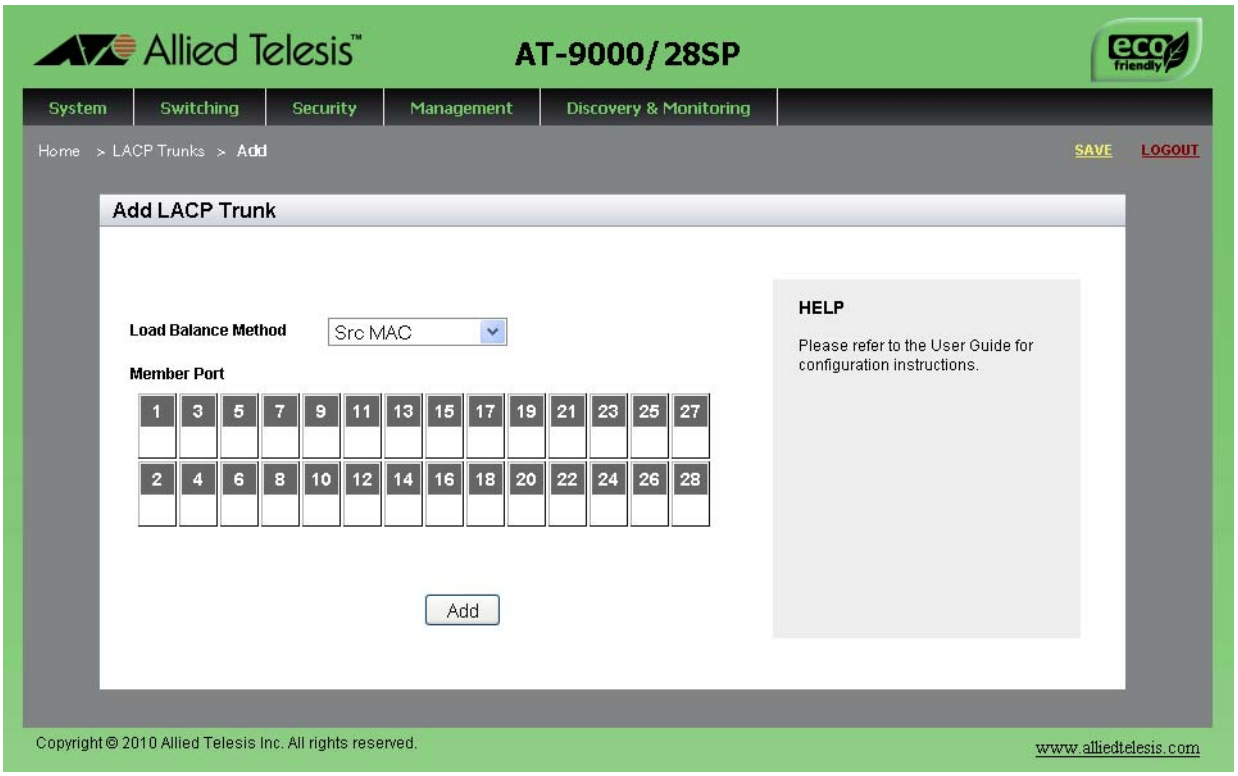


Figure 39. Add LACP Trunk Page

5. Select the Load Balance Method. Choose from the following:
   - **Src MAC**— Specifies source MAC address as the load distribution method.
   - **Dst MAC**— Specifies destination MAC address.
   - **Src-Dst MAC**— Specifies source address/destination MAC address.
   - **Src IP**— Specifies source IP address.
   - **Dst IP**— Specifies destination IP address.
   - **Src-Dst IP**— Specifies source address/destination IP address.
6. Select the member ports of the aggregator by clicking on the ports.
7. Click **Add**.

   A confirmation message is displayed.
8. Click **SAVE**.

Modifying an LACP Trunk

To modify the LACP Trunk settings, see the following procedure:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation selection, see Figure 37 on page 107.

3. Move the cursor to the right and select **LACP**.

   The LACP Trunks page is displayed. See Figure 38 on page 107.

4. From the LACP Trunks page, click Edit next to the Aggregator ID that you want to change.

   The Modify LACP Trunk page is displayed. See Figure 40.

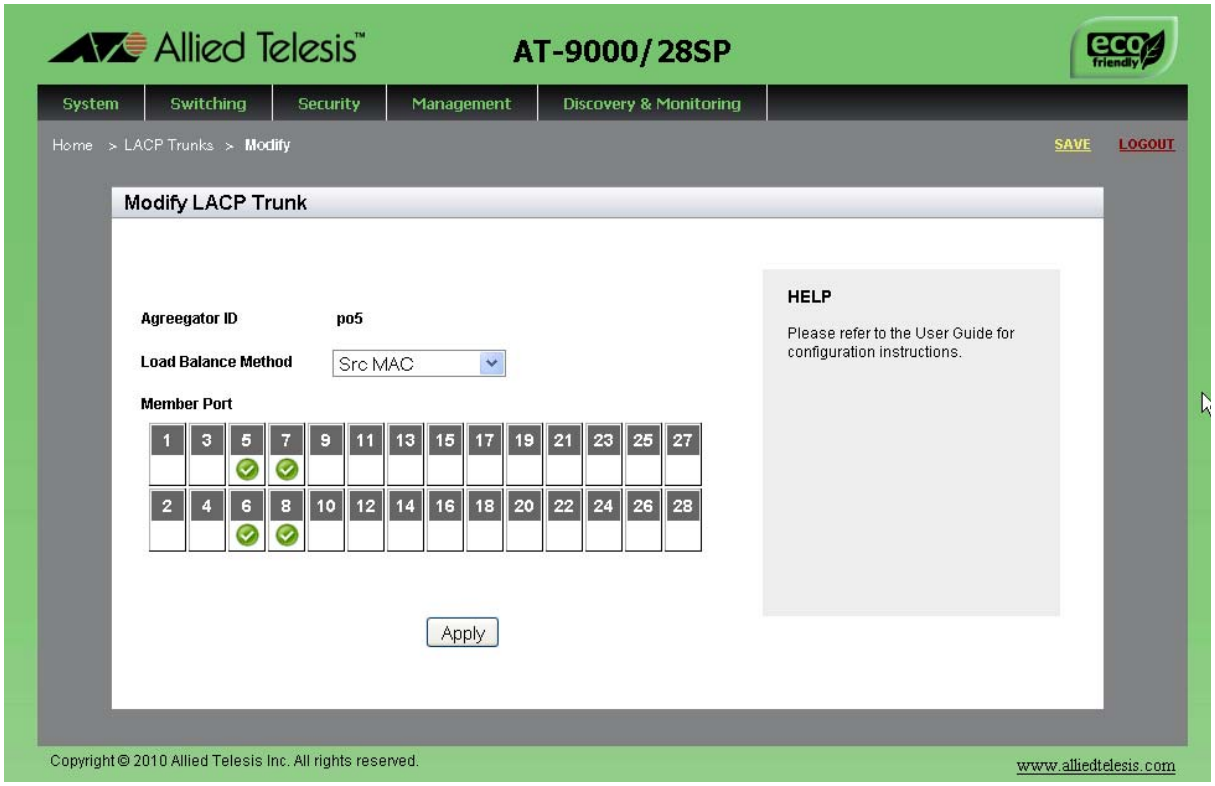


Figure 40. Modify LACP Trunk Page

5. Select the Load Balance Method. Choose from the following:
   - **Src MAC**— Specifies source MAC address as the load distribution method.
   - **Dst MAC**— Specifies destination MAC address.
   - **Src-Dst MAC**— Specifies source address/destination MAC address.
   - **Src IP**— Specifies source IP address.
   - **Dst IP**— Specifies destination IP address.
   - **Src-Dst IP**— Specifies source address/destination IP address.
6. Add or remove the member ports of the aggregator by clicking on the ports.

   A check mark indicates a port has been selected.
7. Click **Apply**.

   A confirmation message is displayed.
8. Click **SAVE**.

Deleting an LACP Trunk

To delete an LACP trunk, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation selection, see Figure 37 on page 107.

3. Move the cursor to the right and select **LACP**.

   The LACP Trunks page is displayed. See Figure 38 on page 107.

4. From the LACP Trunks page, click Delete next to the Aggregator ID that you want to delete.

5. Click **SAVE**.

Chapter 10

Setting Static Port Trunks

Static port trunks are groups of two to eight ports that act as single virtual links between the switch and other network devices. This chapter describes how to display, create, and modify static trunks. See the following sections:

- “Overview” on page 116
- “Displaying Static Trunk Settings” on page 117
- “Adding Static Trunks” on page 119
- “Modifying the Static Trunk Settings” on page 122
- “Deleting Static Trunks” on page 125

For additional guidelines and information regarding static port trunks, see following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- Chapter 31: Static Port Trunks
- Chapter 32: Static Port Trunk Commands

Overview

Static port trunks are commonly used to improve network performance by increasing the available bandwidth between the switch and other network devices as well as to enhance the reliability of the connections between network devices.

When you create a static port trunk, you can designate how the traffic is distributed across the physical links by the switch by defining the load distribution method.

Static port trunks do not permit standby ports, unlike LACP trunks (which are described in Chapter 9, “Setting LACP” on page 105). If a link is lost on a port in a static port trunk, the trunk’s total bandwidth is reduced. Although the traffic carried by a lost link is shifted to one of the remaining ports in the trunk, the bandwidth remains reduced until a lost link is reestablished or another port is manually added to the trunk.

Here are some guidelines regarding static port trunks:

- A static trunk can have up to eight ports.
- The switch supports up to a total of 32 static port trunks and LACP trunks at a time. An LACP trunk is counted against the maximum number of trunks when it is active.
- The ports of a static port trunk can be all twisted pair ports or all fiber optic ports. Static port trunks *cannot* have both types of ports.
- The ports of a trunk can be consecutive (for example ports 5-9) or nonconsecutive (for example, ports 4, 8, 11, 20).

Displaying Static Trunk Settings

To display the static port trunks for all of the switch ports, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation tab, see Figure 41.

Figure 41. Switching Tab with Static Trunks

3. Move the cursor to the right and select **Static Trunks**.

   The Static Trunks page is displayed. See Figure 42. By default, no static trunks are configured on the switch.

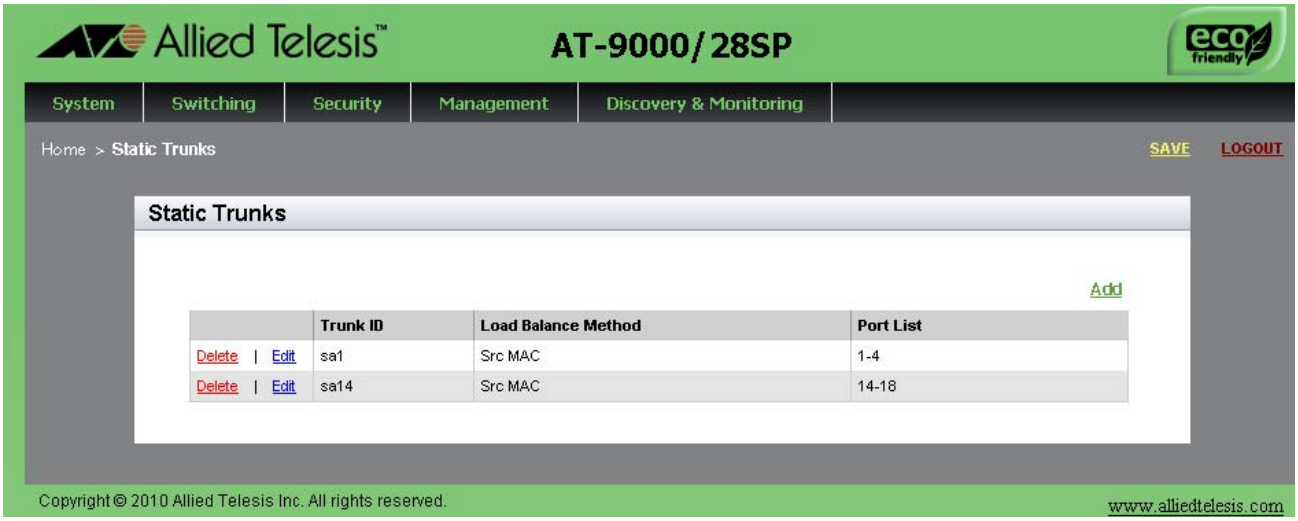


Figure 42. Static Trunks Page

The following fields are displayed:

- **Trunk ID**— Indicates the ID of the static trunk. This name must be the lowest port number appended with “sa.” For example, the trunk ID of “sa5” indicates a trunk with port 5 as the lowest port number in the trunk.
- **Load Balance Method**— Indicates one of the following:

  Src MAC— Specifies source MAC address as the load distribution method. This is a Layer 2 load balance method.

  Dst MAC— Specifies destination MAC address as the load distribution method. This is a Layer 2 load balance method.

  Src -Dst MAC— Specifies source address/destination MAC address as the load distribution method. This is a Layer 2 load balance method.

  Src IP — Specifies source IP address as the load distribution method. This is a Layer 3 load balance method.

  Dst IP — Specifies destination IP address as the load distribution method. This is a Layer 3 load balance method.

  Src-Dst IP — Specifies source address/destination IP address as the load distribution method. This is a Layer 3 load balance method.

- **Port List**— Displays the list of ports that are members of the static trunk.

Adding Static Trunks

Review the following information before creating a new static port trunk:

- When you create a new trunk, the settings of the lowest numbered port are copied to the other ports so that all the ports have the same settings. Therefore, you must examine and verify that the speed, duplex mode, and flow control settings of the lowest numbered port are correct for the network device to which the trunk is connected.
- All ports of a trunk must be members of the same VLAN.
- Ports can be a members of one static port trunk at a time. A port that is already a member of a trunk cannot be added to another trunk. To accomplish this, you must remove the member port from its current trunk assignment first. For instructions, see "Adding Static Trunks" on page 119.

To create an static port trunk, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation selection, see Figure 41 on page 117.

3. Move the cursor to the right and select **Static Trunks**.

   The Static Trunks page is displayed. See Figure 42 on page 117.

4. From the Static Trunks page, click Add.

The Add Static Trunk page is displayed. See Figure 43.

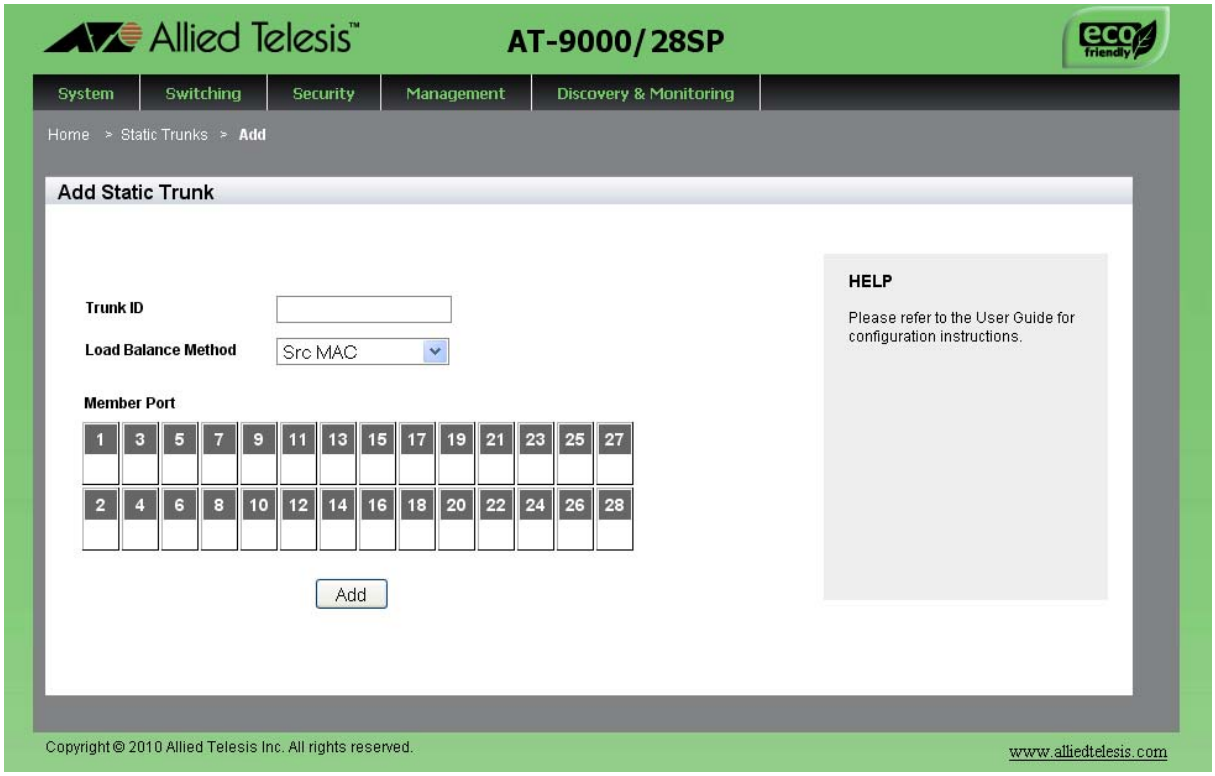


Figure 43. Add Static Trunk Page

5. Select the **Load Balance Method**. You can assign different load distribution methods to different static trunks on the same switch.

   Choose from the following:

   - **Src MAC**— Specifies source MAC address as the load distribution method. This is a Layer 2 load balance method.
   - **Dst MAC**— Specifies destination MAC address as the load distribution method. This is a Layer 2 load balance method.
   - **Src-Dst MAC**— Specifies source address/destination MAC address as the load distribution method. This is a Layer 2 load balance method.
   - **Src IP**— Specifies source IP address as the load distribution method. This is a Layer 3 load balance method.
   - **Dst IP**— Specifies destination IP address as the load distribution method. This is a Layer 3 load balance method.
   - **Src-Dst IP**— Specifies source address/destination IP address as the load distribution method. This is a Layer 3 load balance method.

6. Select the Member Ports by clicking the box next to the port.

   A green check mark indicates a port has been selected.

   Note
   Allied Telesis does not recommend using twisted pair ports 25R to 28R on the AT-9000/28 and AT-9000/28SP Managed Layer 2 ecoSwitches in static port trunks. The performance of a static port trunk that has these ports may not be predictable if the ports transition to the redundant state.

7. Enter the **Trunk ID**.

   This name must be the lowest port number. After you create the static trunk, the software appends this port number with "sa." For example, the trunk ID of "sa5" indicates a trunk with port 5 as the lowest port number in the trunk.

8. Click **Add**.

   A confirmation message is displayed.

Modifying the Static Trunk Settings

Review the following information if you are adding ports to an existing trunk:

- If the port you are adding is the lowest numbered port in the trunk, its parameter settings overwrites the settings of the existing ports in the trunk. Therefore, check if its settings are appropriate *before* adding it to the trunk. If the new port is not the lowest numbered port, its port settings are changed to match the settings of the existing ports in the trunk.
- If the new port added to a trunk is already a member of another static trunk, you must first remove it from its current trunk assignment.

To add or delete member ports from a static port trunk, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation selection, see Figure 41 on page 117.

3. Move the cursor to the right and select **Static Trunks**.

   The Static Trunks page is displayed. See Figure 42 on page 117.

4. From the Static Trunks page, click Edit.

The Modify Static Trunk page is displayed. See Figure 44.

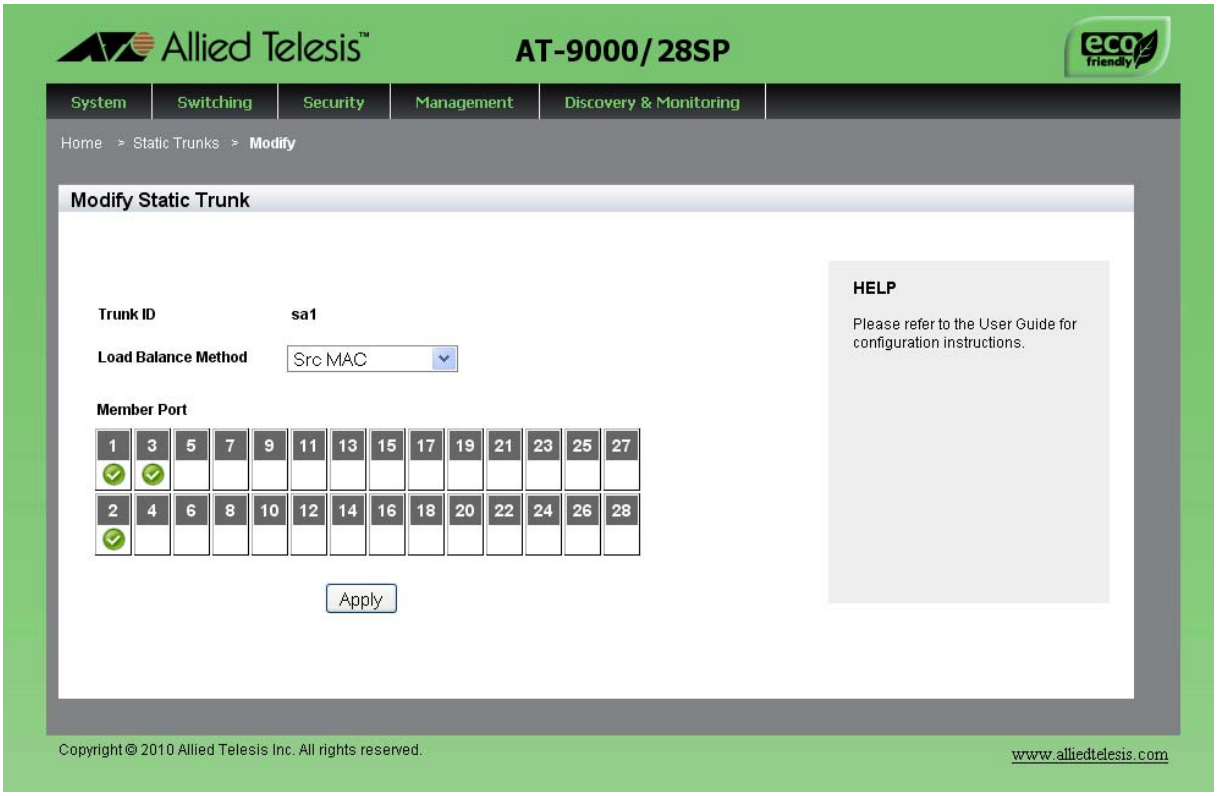


Figure 44. Modify Static Trunk Page

5. Select the **Load Balance Method**. You can assign different load distribution methods to different static trunks on the same switch.

   Choose from the following:

   - **Src MAC**— Specifies source MAC address as the load distribution method. This is a Layer 2 load balance method.
   - **Dst MAC**— Specifies destination MAC address as the load distribution method. This is a Layer 2 load balance method.
   - **Src-Dst MAC**— Specifies source address/destination MAC address as the load distribution method. This is a Layer 2 load balance method.
   - **Src IP**— Specifies source IP address as the load distribution method. This is a Layer 3 load balance method.
   - **Dst IP**— Specifies destination IP address as the load distribution method. This is a Layer 3 load balance method.
   - **Src-Dst IP**— Specifies source address/destination IP address as the load distribution method. This is a Layer 3 load balance method.

6. Select the member ports that you want to add to or remove from the static trunk by clicking on the ports.

Caution
To prevent the formation of network loops in your network topology, do not remove ports from a static port trunk without first disconnecting their network cable. Network loops can result in broadcast storms that can adversely affect network performance.

Note
You cannot have a trunk that contains only one port. There must be a minimum of two ports in a trunk.

7. Click **Apply**.

   A confirmation message is displayed.

Deleting Static Trunks

To delete a static port trunk, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Link Aggregation**.

   For an example of the Link Aggregation selection, see Figure 41 on page 117.

3. Move the cursor to the right and select **Static Trunks**.

   The Static Trunks page is displayed. See Figure 42 on page 117.

4. From the Static Trunks page, click Delete next to the Trunk ID that you want to delete.

Chapter 11

Setting Port-based and Tagged VLANs

This chapter provides a brief description of VLANs and explains how to display, create, and modify port-based and tagged Virtual LANs which are more commonly known as VLANs. See the following sections:

- ❒ “Overview” on page 128
- ❒ “Displaying VLANs” on page 130
- ❒ “Adding an VLAN” on page 132
- ❒ “Modifying VLANs” on page 134
- ❒ “Deleting VLANs” on page 136

For additional information about VLANs, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 40: Port-based and Tagged VLANs
- ❒ Chapter 41: Port-based and Tagged VLAN Commands

Overview

A VLAN is a group of ports that form a logical Ethernet segment on an Ethernet switch. The ports of a VLAN form an independent traffic domain in which the traffic generated by the nodes remains within the VLAN.

VLANs let you segment your network through the switch's management software so that you can group nodes with related functions into their own separate, logical LAN segments. These VLAN groupings can be based on similar data needs or security requirements. For example, you could create separate VLANs for the different departments in your company, such as one for Sales and another for Accounting. Both port-based and tagged VLANs are supported in the web interface.

Port-based VLANs

A port-based VLAN is a group of ports on a Gigabit Ethernet Switch that form a logical Ethernet segment. Each port of a port-based VLAN can belong to only one VLAN at a time. A port-based VLAN can have as many or as few ports as needed. The VLAN can consist of all the ports on an Ethernet switch, or just a few ports. In addition, a port-based VLAN can span switches and consist of ports from multiple Ethernet switches.

Ports in a port-based VLAN are referred to as *untagged ports* and the frames received on the ports as *untagged frames*. The names derive from the fact that the frames received on a port do not contain any information that indicates VLAN membership, and that VLAN membership is determined solely by a port's PVID.

Port VLAN Identifier

Each port in a port-based VLAN must have a port VLAN identifier (PVID). The switch associates a frame to a port-based VLAN by the PVID assigned to a port on which a frame is received, and forwards a frame only to those ports with the same PVID. Consequently, all ports of a port-based VLAN must have the same PVID. In addition, the PVID of the ports in a VLAN must match the VLAN's VID.

For example, if you create a port-based VLAN on the switch and assign it the VID 5, the PVID for each port in the VLAN needs to be assigned the value of 5.

Tagged VLANs

The second type of VLAN is the tagged VLAN. VLAN membership in a tagged VLAN is determined by information within the frames that are received on a port. This differs from a port-based VLAN, where the PVIDs assigned to the ports determine VLAN membership.

The VLAN information within an Ethernet frame is referred to as a *tag* or *tagged header*. A tag, which follows the source and destination addresses in a frame, contains the VID of the VLAN to which the frame belongs (IEEE 802.3ac standard). This number uniquely identifies each VLAN in a network.

When the switch receives a frame with a VLAN tag, referred to as a *tagged frame*, the switch forwards the frame only to those ports that share the same VID.

A port that receives or transmits tagged frames is referred to as a *tagged port*. Any network device connected to a tagged port must be IEEE 802.1Q-compliant. This is the standard that outlines the requirements and standards for tagging. The device must be able to process the tagged information on received frames and add tagged information to transmitted frames.

Tagged and Untagged Ports

You need to specify which ports are members of the VLAN. In the case of a tagged VLAN, it is usually a combination of both untagged ports and tagged ports. You specify which ports are tagged and which untagged when you create the VLAN.

An untagged port, whether a member of a port-based VLAN or a tagged VLAN, can be in only one VLAN at a time. However, a tagged port can be a member of more than one VLAN. A port can also be an untagged member of one VLAN and a tagged member of different VLANs simultaneously.

Displaying VLANs

To display the VLAN assignments for all of the switch ports, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Virtual LANs**.

   The VLANs page is displayed. For an example of the VLANs page, see Figure 45.

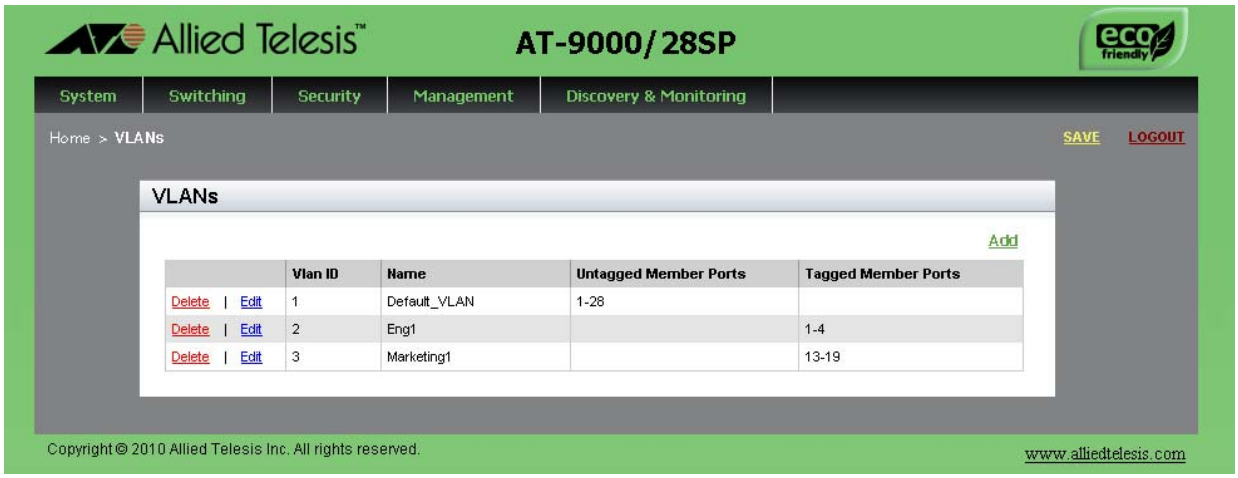


Figure 45. VLANs Page

The following fields are displayed:

- **Vlan ID**— Specifies a VLAN identifier. The range is 2 to 4094. The VID of 1 is reserved for the default VLAN. The VID cannot be the same as the VID of an existing VLAN on the switch. If this VLAN is unique in your network, its VID must also be unique. However, if this VLAN is part of a larger VLAN that spans multiple switches, the VID value for the VLAN must be the same on each switch. For example, if you are creating a VLAN called Sales with a VID of 3 that spans three switches, assign the Sales VLAN on each switch the same VID value.
- **Name**— Specifies a name of a VLAN. A name can be from 1 to 20 characters in length. The first character must be a letter; it cannot be a number. VLANs are easier to identify if their names reflect the functions of their subnetworks or workgroups (for example, Sales or Accounting). A name cannot contain spaces or special characters, such as asterisks (*) or exclamation points (!). A name cannot be the same as a name of an existing VLAN on the switch.

If a VLAN is unique in your network, then its name must be unique as well. A VLAN that spans multiple switches must have the same name on each switch.

- **Untagged Member Ports**— Indicates which ports are untagged ports.
- **Tagged Member Ports**— Indicates which ports are tagged ports.

Note
By default, there is one VLAN configured. This is the default VLAN with a Vlan ID of 1. All ports on the switch are assigned to the default VLAN. All ports in Vlan ID 1 are untagged by default.

Note
For information about tagged and untagged ports, see "Overview" on page 128.

Adding an VLAN

To create an VLAN, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Virtual LANs**.

   The Virtual LANs page is displayed. See Figure 45 on page 130.

3. From the VLANs page, click Add.

   The Add VLAN page is displayed. See Figure 46.

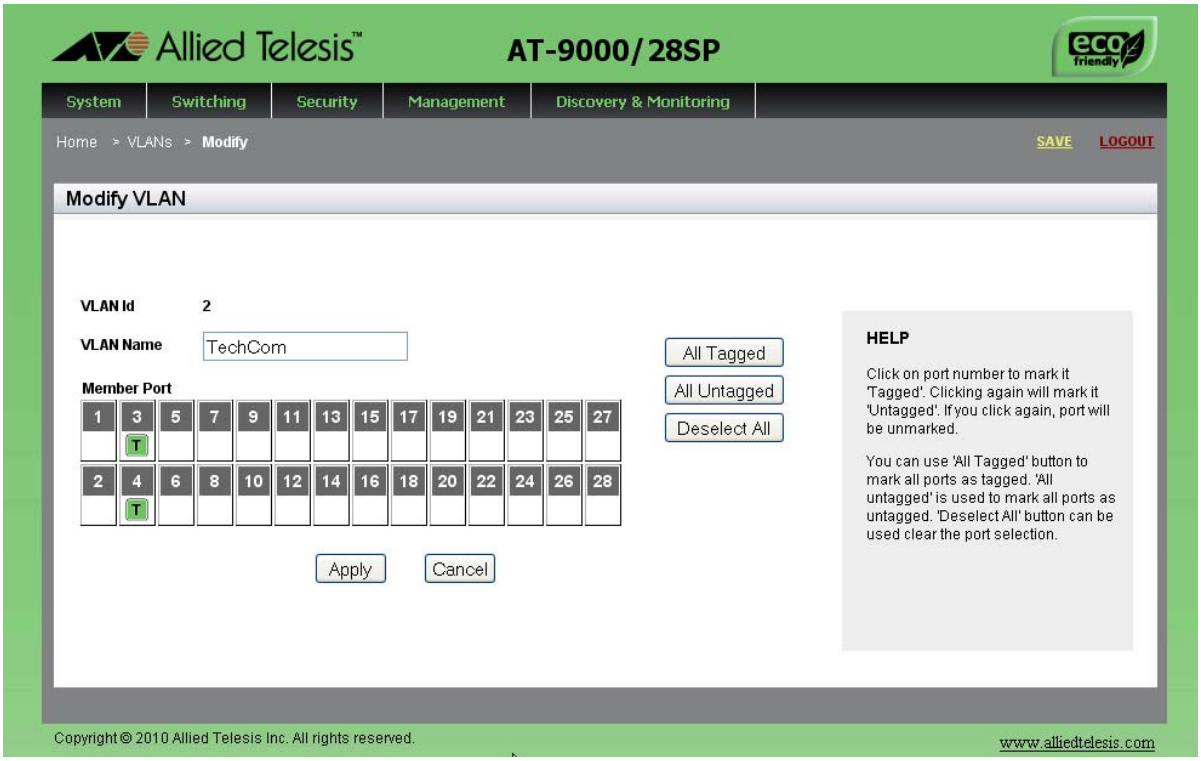


Figure 46. Add VLAN Page

4. Change the following settings as needed:

   - **Vlan ID**— Specifies a VLAN identifier. The range is 2 to 4094. The VID 1 is reserved for the Default_VLAN. The VID cannot be the same as the VID of an existing VLAN on the switch. If this VLAN is unique in your network, its VID must also be unique. However, if this VLAN is part of a larger VLAN that spans multiple switches, the VID value for the VLAN must be the same on each switch. For example, if you are creating a VLAN called Sales with a VID of 3

that spans three switches, assign the Sales VLAN on each switch the a VID value of 3.

- **VLAN Name**— Specifies a name of a VLAN. A name can be from 1 to 20 characters in length. The first character must be a letter; it cannot be a number. VLANs are easier to identify if their names reflect the functions of their subnetworks or workgroups (for example, Sales or Accounting). A name cannot contain spaces or special characters, such as asterisks (*) or exclamation points (!). A name cannot be the same as a name of an existing VLAN on the switch. If a VLAN is unique in your network, then its name must be unique as well. A VLAN that spans multiple switches must have the same name on each switch.
- **Member Port**— Click a port to add it to the VLAN. A "T" indicates a port is a tagged port. A "U" indicates the port is an untagged port.

Note
For information about tagged and untagged ports, see "Overview" on page 128.

- **All Tagged**— Click this button to make all ports on the switch tagged ports.
- **All Untagged**— Click this button to make all ports on the switch untagged ports.
- **Deselect All**— Click this button to deselect, or unclick, all of the selected ports.

5. Click **Apply** to save your changes to the running configuration file.

   A confirmation message is displayed.

Modifying VLANs

To modify the LACP Trunk settings, see the following procedure:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Virtual LANs**.

   The Virtual LANs page is displayed. See Figure 45 on page 130.

3. From the VLANs page, click Edit next to the VLAN ID that you want to modify.

   The Modify VLAN page is displayed. See Figure 47.

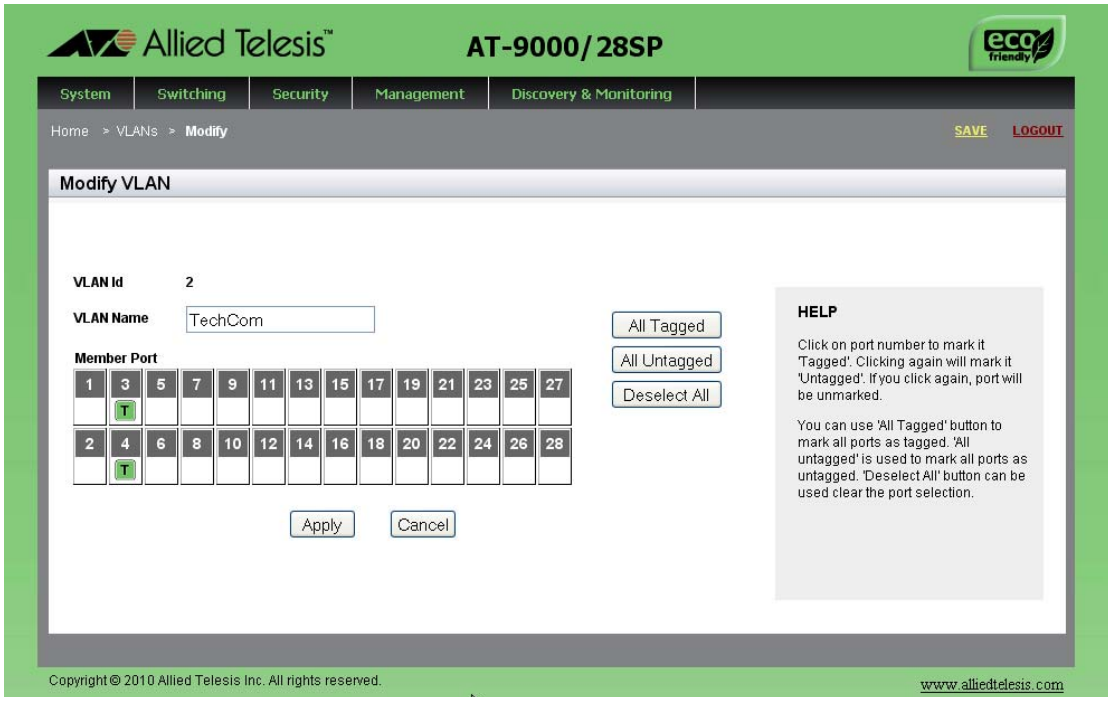


Figure 47. Modify VLAN Page

Note
The Vlan ID specifies a VLAN identifier. The range is 2 to 4094. The VID 1 is reserved for the Default_VLAN. The VID cannot be the same as the VID of an existing VLAN on the switch. If this VLAN is unique in your network, its VID must also be unique. However, if this VLAN is part of a larger VLAN that spans multiple switches, the VID value for the VLAN must be the same on each switch.

4. Change the following fields as needed:

   - **VLAN Name**— Specifies a name of a VLAN. A name can be from 1 to 20 characters in length. The first character must be a letter; it cannot be a number. VLANs are easier to identify if their names reflect the functions of their subnetworks or workgroups (for example, Sales or Accounting). A name cannot contain spaces or special characters, such as asterisks (*) or exclamation points (!). A name cannot be the same as a name of an existing VLAN on the switch. If a VLAN is unique in your network, then its name must be unique as well. A VLAN that spans multiple switches must have the same name on each switch.
   - **All Tagged**— Click this button to make all ports on the switch tagged ports.
   - **All Untagged**— Click this button to make all ports on the switch untagged ports.
   - **Deselect All**— Click this button to deselect, or unclick, all of the selected ports.

5. Click **Apply**.

   A confirmation message is displayed.

Deleting VLANs

To delete an VLAN, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Virtual LANs**.

   For an example of the Virtual LANs page is displayed, see Figure 45 on page 130.

3. From the VLANs page, click Delete next to the VLAN that you want to remove.

   The selected VLAN is removed.

Note
You cannot remove the default VLAN which has an Vlan ID of 1.

Chapter 12

Setting Switch Spanning Tree Protocols

This chapter provides a brief description of both the Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocol (RSTP) and explains how to set the spanning tree protocols on the switch. See the following sections:

- ❒ “Overview” on page 138
- ❒ “Displaying Switch Spanning Tree Protocol Settings” on page 139
- ❒ “Modifying Switch Spanning Tree Protocol Settings” on page 142

Note
For information about how to set a spanning tree protocol on the ports, see Chapter 7, “Setting the Port Spanning Tree Protocol” on page 89.

For more information about spanning tree, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 35: Spanning Tree and Rapid Spanning Tree Protocols
- ❒ Chapter 36: Spanning Tree Protocol (STP)
- ❒ Chapter 37: STP Commands
- ❒ Chapter 38: Rapid Spanning Tree Protocol (RSTP)
- ❒ Chapter 39: RSTP Commands

Overview

Both STP and RSTP guard against the formation of loops in an Ethernet network topology. A topology has a loop when two or more nodes can transmit packets to each other over more than one data path. Packets can become caught in repeating cycles, referred to as broadcast storms, that needlessly consume network bandwidth and that can significantly reduce network performance.

STP and RSTP prevent loops from forming by ensuring that only one path exists between the end nodes in your network. Where multiple paths exist, these protocols place the extra paths in a standby or blocking mode. In addition, STP and RSTP can activate redundant paths if primary paths go down. These protocols guard against multiple links between segments and the risk of broadcast storms and maintain network connectivity by activating backup redundant paths.

One of the primary differences between the two protocols is in the time each takes to complete the process referred to as convergence. When a change is made to the network topology, such as the addition of a new bridge, a spanning tree protocol determines whether there are redundant paths that must be blocked to prevent data loops, or activated to maintain communications between the various network segments. This is the process of convergence.

With STP, convergence can take up to a minute to complete in a large network. This can result in the loss of communication between various parts of the network during the convergence process, and the subsequent lost of data packets.

RSTP is much faster than STP. It can complete a convergence in seconds, and so greatly diminish the possible impact the process can have on your network. Only one spanning tree can be active on the switch at a time. The default setting is RSTP.

Displaying Switch Spanning Tree Protocol Settings

To display the switch Spanning Tree Protocol settings do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Spanning Tree**.

   The Spanning Tree Settings page is displayed. See Figure 48.

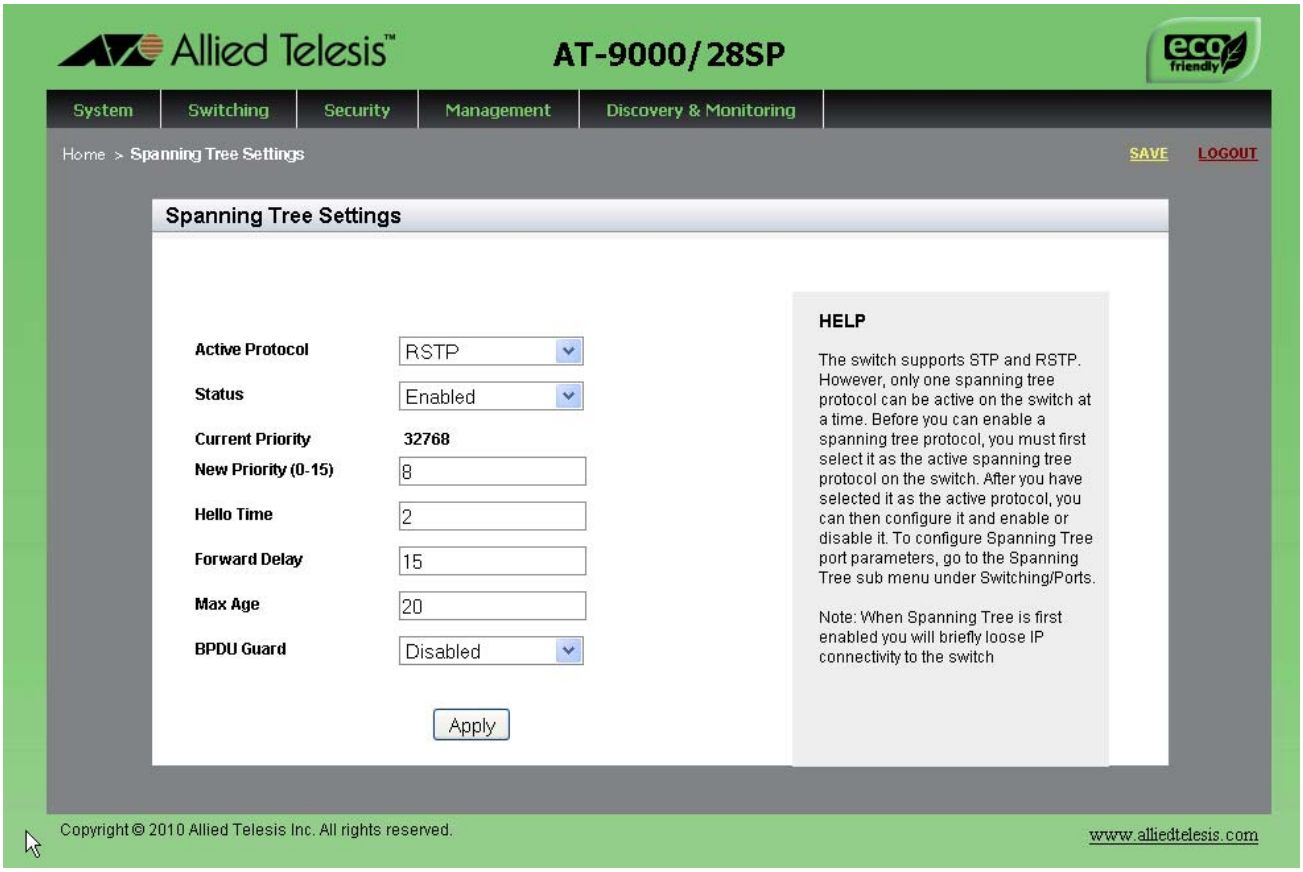


Figure 48. Spanning Tree Settings Page

The following fields are displayed:

- **Active Protocol**— Indicates if the active spanning tree protocol is STP or RSTP. The default setting is RSTP.
- **Status**— Indicates if the spanning tree protocol is enabled or disabled on the switch.
- **Current Priority**— By default, the current priority is set to 32,768. You cannot change this field.

- **New Priority (0-15)**— Assigns the switch a priority number. The device that has the lowest priority number in the spanning tree domain becomes the root bridge. If two or more devices have the same priority value, the device with the numerically lowest MAC address becomes the root bridge.

  The range is 0 to 61,440, in increments of 4,096. The range is divided into the sixteen increments listed in Table 2. You specify the increment that represents the desired bridge priority value. The default value is 32,768 (increment 8).

Table 2. STP Bridge Priority Value Increments

Increment	Bridge Priority	Increment	Bridge Priority
0	0	8	32768
1	4096	9	36864
2	8192	10	40960
3	12288	11	45056
4	16384	12	49152
5	20480	13	53248
6	24576	14	57344
7	28672	15	61440

Note
Set the hello time, forward delay, and max-age fields according to the following formulas, as specified in IEEE Standard 802.1d:
max-age <= 2 x (forward time - 1.0 second)
max-age => 2 x (hello time + 1.0 second)

- **Hello Time**— Indicates the frequency that the switch sends spanning tree configuration information when it is the root bridge or is trying to become the root bridge.
- **Forward Delay**— Indicates the forward time parameter on the switch. This field specifies how long the ports remain in the listening and learning states before they transition to the forwarding state.

  The Forward Delay value is active only when the switch is acting as the root bridge of the spanning tree domain. Switches that are not acting as the root bridge use a dynamic value supplied by the root bridge.

- **Max Age**— Determines how long bridge protocol data units (BPDUs) are stored by the switch before they are deleted.
- **BPDU Guard**— Enables the BPDU loop-guard feature on the switch. If a port that has this feature activated stops receiving BPDU packets, the switch automatically disables it. A port that has been disabled by the feature remains in that state until it begins to receive BPDU packets again or the switch is reset. The default setting for BPDU loop-guard on the ports is disabled.

Modifying Switch Spanning Tree Protocol Settings

To modify port settings for Spanning Tree Protocol, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **Spanning Tree**.

   The Switch Spanning Tree Settings page is displayed. See Figure 48 on page 139.

3. Change the following settings as needed:

   - **Active Protocol**— Indicates if the active spanning tree protocol is STP or RSTP. The default setting is RSTP.
   - **Status**— Indicates if the spanning tree protocol is enabled or disabled on the switch.
   - **Current Priority**— By default, the current priority is set to 32,768. You cannot change this field.
   - **New Priority (0-15)**— Assigns the switch a priority number. The device that has the lowest priority number in the spanning tree domain becomes the root bridge. If two or more devices have the same priority value, the device with the numerically lowest MAC address becomes the root bridge.

     The range is 0 to 61,440, in increments of 4,096. The range is divided into the sixteen increments listed in Table 2. You specify the increment that represents the desired bridge priority value. The default value is 32,768 (increment 8).

Table 3. STP Bridge Priority Value Increments

Increment	Bridge Priority	Increment	Bridge Priority
0	0	8	32768
1	4096	9	36864
2	8192	10	40960
3	12288	11	45056
4	16384	12	49152
5	20480	13	53248
6	24576	14	57344

Table 3. STP Bridge Priority Value Increments (Continued)

Increment	Bridge Priority	Increment	Bridge Priority
7	28672	15	61440

Note
Set the hello time, forward delay, and max-age fields according to the following formulas, as specified in IEEE Standard 802.1d:
max-age <= 2 x (forward time - 1.0 second)
max-age => 2 x (hello time + 1.0 second)

- **Hello Time**— Indicates the frequency that the switch sends spanning tree configuration information when it is the root bridge or is trying to become the root bridge.
- **Forward Delay**— Sets the forward time parameter on the switch and specifies how long the ports remain in the listening and learning states before they transition to the forwarding state.

  This Forward Delay value is active only when the switch is acting as the root bridge of the spanning tree domain. Switches that are not acting as the root bridge use a dynamic value supplied by the root bridge.
- **Max Age**— Determines how long bridge protocol data units (BPDUs) are stored by the switch before they are deleted.
- **BPDU Guard**— Enables the BPDU loop-guard feature on the switch. If a port that has this feature activated stops receiving BPDU packets, the switch automatically disables it. A port that has been disabled by the feature remains in that state until it begins to receive BPDU packets again or the switch is reset. The default setting for BPDU loop-guard on the ports is disabled.

4. Click **Apply**.

Chapter 13

Setting Internet Group Management Protocol (IGMP) Snooping

This chapter provides a brief description of IGMP Snooping and explains how to set this feature on the switch. See the following sections:

- ❒ “Overview” on page 146
- ❒ “Displaying and Modifying IGMP Snooping Configuration” on page 147
- ❒ “Clearing the Routers List” on page 149
- ❒ “Disabling IGMP Snooping” on page 151
- ❒ “Displaying the Routers List” on page 152
- ❒ “Displaying the Hosts List” on page 153

For more information about IGMP, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 19: Internet Group Management Protocol (IGMP) Snooping
- ❒ Chapter 20: IGMP Commands

Overview

IGMP snooping allows the switch to control the flow of multicast packets from its ports. It enables the switch to forward packets of multicast groups to those ports that have host nodes.

IGMP is used by IPv4 routers to create lists of nodes that are members of multicast groups. (A multicast group is a group of end nodes that want to receive multicast packets from a multicast application.) The router creates a multicast membership list by periodically sending out queries to the local area networks connected to its ports.

A node that wants to become a member of a multicast group responds to a query by sending a report. A report indicates that an end node wants to become a member of a multicast group. Nodes that join a multicast group are referred to as host nodes. After joining a multicast group, a host node must continue to periodically issue reports to remain a member.

After the router has received a report from a host node, it notes the multicast group that the host node wants to join and the port on the router where the node is located. Any multicast packets belonging to that multicast group are then forwarded by the router from the port. If a particular port on the router has no nodes that want to be members of multicast groups, the router does not send multicast packets from the port. This improves network performance by restricting the multicast packets only to router ports where host nodes are located.

Displaying and Modifying IGMP Snooping Configuration

To display and modify the IGMP Configuration settings, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **IGMP**.

   The IGMP Snooping page is displayed. By default, the Configuration tab is selected. See Figure 49.

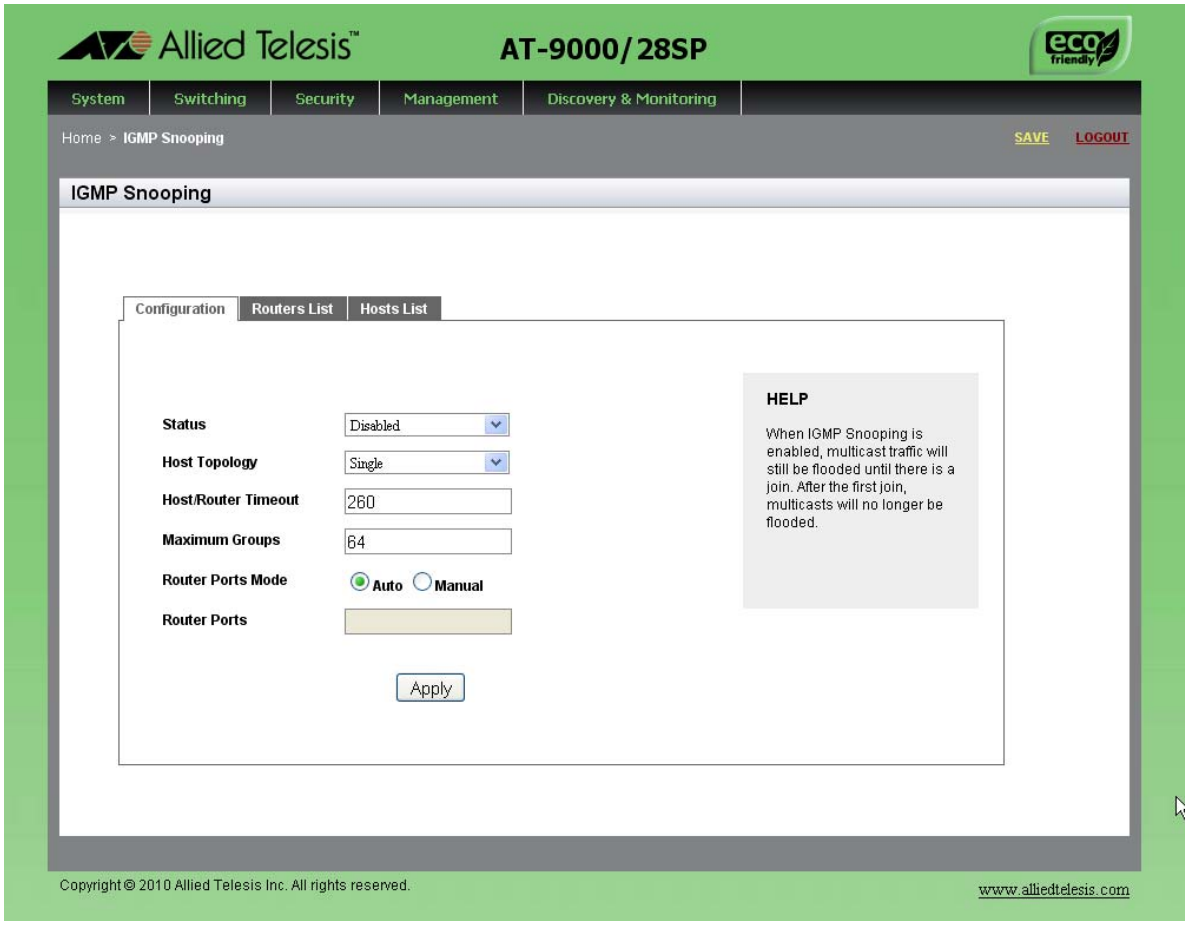


Figure 49. IGMP Snooping Page with Configuration Tab

3. Change the following settings as needed:

   - **Status**— Indicates if IGMP Snooping is active or inactive. Select "Enabled" to activate IGMP or "Disabled" to make this feature inactive. When you enable IGMP, the switch begins to build its multicast tables as queries from the multicast router and reports from the host nodes arrive on its ports. When you disable IGMP,

the switch floods the multicast packets on all of the ports except those that receive the packets.

- **Host Topology**— Specifies the IGMP host topology. Choose between “Single” which indicates a single host per port and “Multicast” which indicates multiple hosts per port. Select the single-host per port setting when the switch has one-host-node per port. Select the multiple setting when the switch has more than one host-node per port. By default, the switch is set to “Single.”
- **Host/Router Timeout**— Indicates the time, in seconds that the switch times out when it finds inactive host nodes and multicast routers. The range is from 0 to 86,400 seconds (24 hours). The default is 260 seconds.Setting the timeout to zero (0) disables the timer.
- **Maximum Groups**— Specifies the maximum number of multicast addresses the switch is allowed to learn. The range is 0 to 255 multicast addresses. If your network has a large number of multicast groups, use this parameter to limit the number of multicast groups the switch supports.The default is 64.
- **Router Ports Mode**— Specifies ports that are connected to multicast routers either manually or automatically. Manually specifying multicast router ports deactivates auto-detect. To reactivate auto-detect, select “Automatic.” Choose between “Manual” and “Automatic.”
- **Router Ports**— Specifies ports that are manually connected to multicast routers. Manually specifying multicast router ports deactivates auto-detect.

4. Click **Apply**.

Clearing the Routers List

To clear the group membership on the IGMP Routers List, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **IGMP**.

   The IGMP Snooping page is displayed with the Configuration tab selected by default. See Figure 49 on page 147.

3. Click the **Routers List** tab.

   The IGMP Snooping page with the Routers tab selected is displayed. See Figure 50 on page 149.

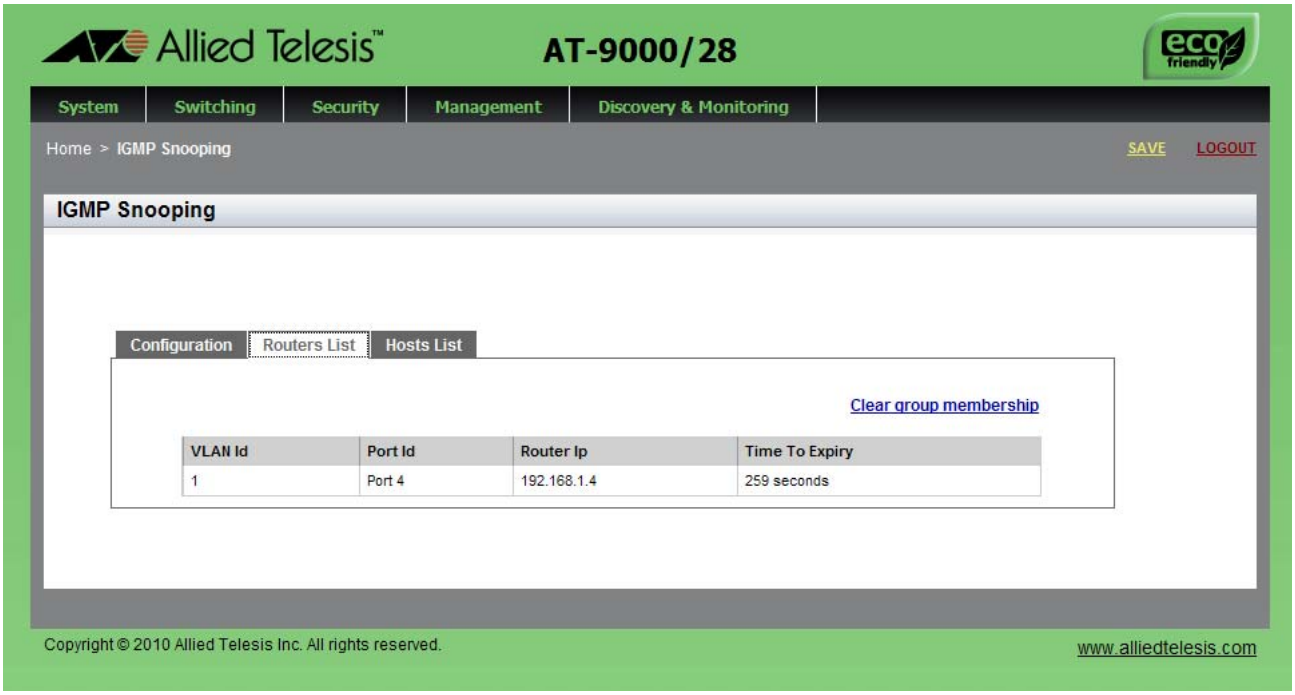


Figure 50. IGMP Snooping Page with Routers List Tab

The following settings are displayed:

- **VLAN ID**— Indicates the ID numbers of the VLANs of the router ports.
- **Port ID**— Specifies the port of a multicast router. If the switch learned a router on a port trunk, a trunk ID number is displayed instead of a port number.

- **Router IP**— Indicates the IP addresses of the multicast routers.
- **Time to Expiry**— Specifies the number of seconds remaining before the switch times out a multicast router if there are no further IGMP queries from it.

4. Click **Clear group membership** to remove the static multicast router ports.

   Removing all multicast router ports also activates auto-detect.

Disabling IGMP Snooping

To disable the IGMP Configuration on the switch, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **IGMP**.

   The IGMP Snooping page is displayed with the Configuration tab selected by default. See Figure 49 on page 147.

3. Use the pull-down menu next to the **Status** field to select "Disabled."

   When you disable IGMP snooping, the switch floods the multicast packets on all of the ports except those that receive the packets.

4. Click **Apply**.

Displaying the Routers List

To display the IGMP Routers List, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **IGMP**.

   The IGMP Snooping page is displayed with the Configuration tab selected by default. See Figure 49 on page 147.

3. Click the **Routers List** tab.

   The IGMP Snooping page with the Routers tab selected is displayed. See Figure 50 on page 149.

   The following settings are displayed:

   - **VLAN ID**— Indicates the ID numbers of the VLANs of the router ports.
   - **Port ID**— Specifies the port of a multicast router. If the switch learned a router on a port trunk, the trunk ID number instead of a port number is displayed.
   - **Router IP**— Indicates the IP addresses of the multicast routers.
   - **Time to Expiry**— Specifies the number of seconds remaining before the switch times out a multicast router if there are no further IGMP queries from it.

Displaying the Hosts List

To display the IGMP Hosts List, do the following:

1. Select the **Switching** tab.

   The Switching tab is displayed. See Figure 19 on page 58.

2. From the Switching tab, select **IGMP**.

   The IGMP Snooping page is displayed with the Configuration tab selected by default. See Figure 49 on page 147.

3. Click the **Hosts List** tab.

   The Hosts List page is displayed. See Figure 51.

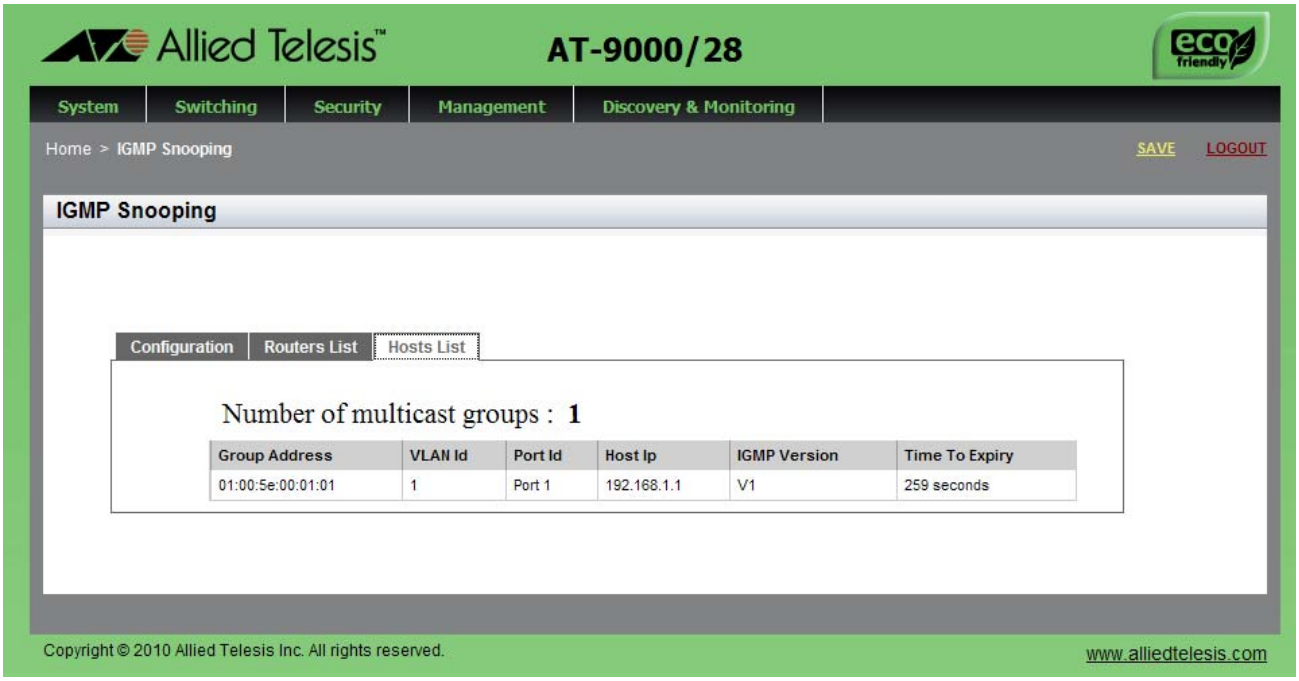


Figure 51. IGMP Snooping Page with Hosts List Tab

The following settings are displayed:

- **Group Address**— Indicates the multicast addresses of the groups.
- **VLAN ID**— Indicates the VLAN ID of the host nodes.
- **Port ID**— Specifies the ports of the host nodes. If the host nodes are on port trunks, this field displays the trunk ID numbers instead of the port numbers.
- **Host IP**— Specifies the IP addresses of the host nodes.

- **IGMP Version**— Indicates the IGMP versions used by the host nodes.
- **Time to Expiry**— Specifies the number of seconds remaining before host nodes are timed out if they do not send IGMP reports.

Chapter 14

Setting MAC Address-based Port Security

This chapter provides a brief description of MAC address-based port security and explains how to set this feature on the switch. See the following sections:

- ❒ “Overview” on page 156
- ❒ “Displaying the MAC Address-based Port Security Settings” on page 158
- ❒ “Modifying the MAC Address-based Port Security Settings” on page 160
- ❒ “Disabling MAC Address-based Port Security Settings” on page 162

For more information about MAC address-based security, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 48: MAC Address-based Port Security
- ❒ Chapter 49: MAC Address-based Port Security Commands

Overview

This feature lets you control access to the ports on the switch based on the source MAC addresses of the network devices. You specify the maximum number of source MAC addresses that ports can learn. Ports that learn their maximum number of addresses discard packets that have new, unknown addresses, preventing access to the switch by any additional devices.

For example, if you configure port 3 on the switch to learn five source MAC addresses, the port learns up to five address and forwards the ingress packets of the devices that belong to those addresses. If the port receives ingress packets that have source MAC addresses other than the five it has already learned, it discards those packets to prevent the devices from passing traffic through the switch.

Static Versus Dynamic Addresses

The MAC addresses that the ports learn can be stored as either static or dynamic addresses in the MAC address table in the switch. Ports that store the addresses as static addresses do not learn new addresses after they have learned their maximum number. In contrast, ports that store the addresses as dynamic addresses can learn new addresses when addresses are timed out from the table by the switch. The addresses are aged out according to the aging time of the MAC address table.

Intrusion Actions

The intrusion actions define what the switch does when ports that have learned their maximum number of MAC addresses receive packets that have unknown source MAC addresses. Intrusion actions are also called violation actions. The possible settings are:

- Protect - Ports discard those frames that have unknown MAC addresses. No other action is taken. For example, if port 14 is configured to learn 18 addresses, it starts to discard packets with unknown source MAC addresses after learning 18 MAC addresses.
- Restrict - This is the same as the protect action, except that the switch sends SNMP traps when the ports discard frames. For example, if port 12 is configured to learn two addresses, the switch sends a trap every time the port, after learning two addresses, discards a packet that has an unknown MAC address.
- Shutdown - The switch disables the ports and sends SNMP traps. For example, if port 5 is configured to learn three MAC addresses, it is disabled by the switch to prevent it from forwarding any further traffic if it receives a packet with an unknown source MAC address, after learning three addresses. The switch also sends an SNMP trap.

Guidelines

Here are the guidelines to MAC address-based port security:

- The filtering of a packet occurs on the ingress port, not on the egress port.
- You cannot use MAC address-based port security and 802.1x port-based access control on the same port. To configure a port as an Authenticator or Supplicant in 802.1x port-based access control, you must remove MAC address-based port security.
- MAC address-based port security is not supported on the optional GBIC, SFP, or XFP modules.
- You can manually add static addresses to ports that are configured for this security. The manually added addresses are not counted against the maximum number of addresses the ports can learn.

Displaying the MAC Address-based Port Security Settings

To display the MAC address-based port security settings, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52.

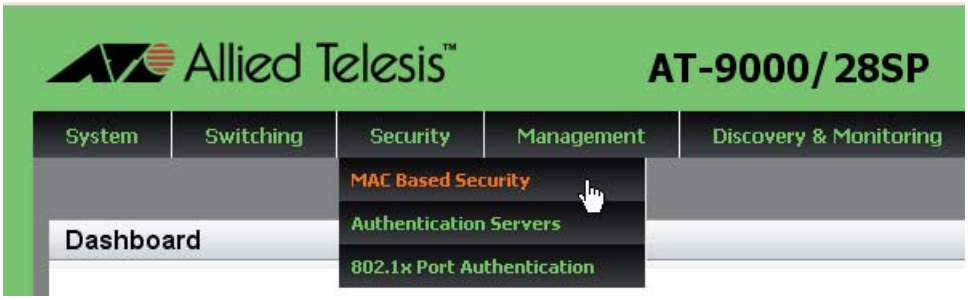


Figure 52. Security Tab

2. From the Security tab, select **MAC Based Security**.

   The MAC Based Port Security page is displayed. See Figure 53.

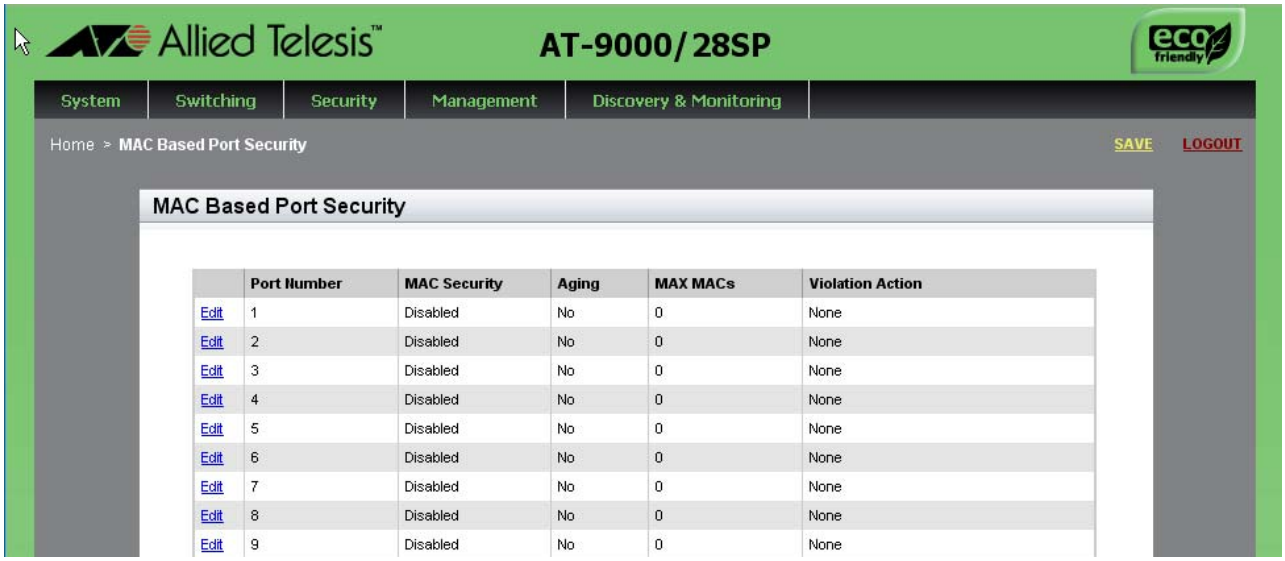


Figure 53. MAC Based Port Security Page

The following fields are displayed:

- **Port Number**— Indicates the port number.
- **MAC Security**— Indicates MAC address-based security is either “Enabled” or “Disabled” on a port. By default, this setting is disabled.

- **Aging**— Indicates the ports that can or cannot add the source MAC addresses as dynamic MAC address in the MAC address table. Ports that learn their maximum numbers of addresses can learn new addresses as inactive addresses are deleted from the table. A "Yes" value indicates a port that can add source MAC addresses. A "No" value indicates a port that cannot add source MAC addresses. By default, this field is set to "No."
- **MAX MACs**— Indicates maximum number of dynamic MAC addresses the port is permitted to learn. The range is 0 to 255. By default, this field is set to 0.
- **Violation Action**— Indicates the intrusion action of the port. Choose from the followings actions:

None	Indicates no intrusion action is assigned to the port. This is the default setting.
Protect	Protects intrusion action.
Restrict	Restricts intrusion action.
Disable	Shuts down intrusion action.

Modifying the MAC Address-based Port Security Settings

To the modify the MAC address-based port security settings, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **MAC Based Security**.

   The MAC Based Port Security page is displayed. See Figure 53 on page 158.

3. Click Edit next to the port that you want to modify.

   The Modify MAC Based Port Security page is displayed. See Figure 54.

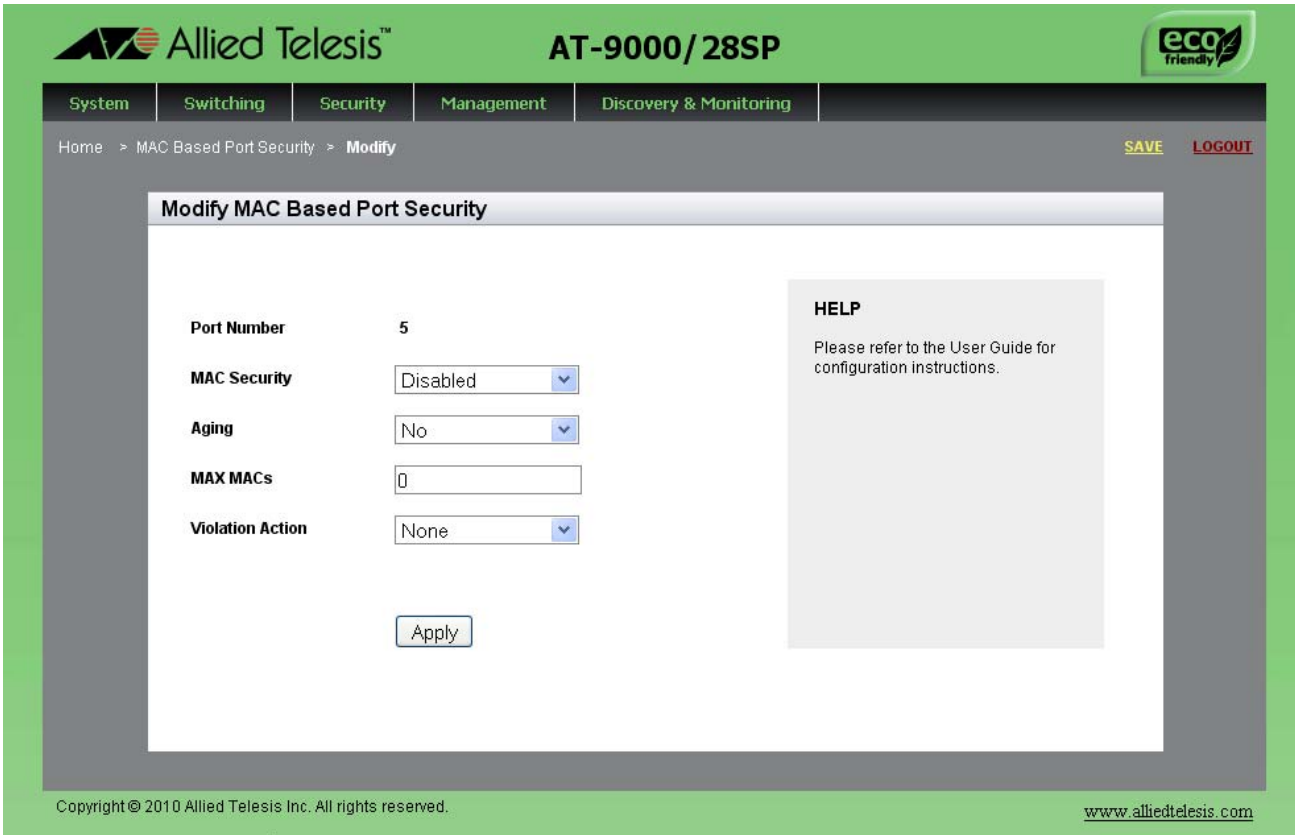


Figure 54. Modify MAC Based Port Security Page

4. Change the following settings as needed:

   - **Port Number**— Indicates the port number.
   - **MAC Security**— Activates or deactivates MAC address-based security on ports. Choose either "Enabled" or "Disabled."
   - **Aging**— Indicates the ports that can or cannot add the source MAC addresses as dynamic MAC address in the MAC address table. Ports that learn their maximum numbers of addresses can learn new addresses as inactive addresses are deleted from the table. Choose from the following options:

Yes	Indicates a port that can add source MAC addresses.
No	Indicates a port that cannot add source MAC addresses.

   - **MAX MACs**— Indicates maximum number of dynamic MAC addresses the port is permitted to learn. The range is 0 to 255.
   - **Violation Action**— Indicates the intrusion action of the port. Choose from the following:

None	Indicates no intrusion action is assigned to the port. This is the default setting.
Protect	Protects intrusion action.
Restrict	Restricts intrusion action.
Disable	Shuts down intrusion action.

5. Click **Apply**.

Disabling MAC Address-based Port Security Settings

To deactivate MAC address-based port security settings, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **MAC Based Security**.

   The MAC Based Port Security page is displayed. See Figure 53 on page 158.

3. Click Edit next to the port that you want to remove.

   The Modify MAC Based Port Security page is displayed. See Figure 54 on page 160.

4. Use the pull-down menu next to the **MAC Security** field and select “Disabled.”

5. Click **Apply**.

Chapter 15

Setting RADIUS and TACACS+ Clients

This chapter provides a brief description of both the RADIUS and TACACS+ clients and explains how to configure these clients on the switch.

See the following sections:

- ❒ “Overview” on page 164
- ❒ “Selecting the Authentication Method” on page 166
- ❒ “Configuring the Authentication Server” on page 168
- ❒ “Deleting an Authentication Server” on page 173

For more information about the authentication server features, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 78: RADIUS and TACACS+ Clients
- ❒ Chapter 79: RADIUS and TACACS+ Client Commands

Overview

The switch has RADIUS and TACACS+ clients for remote authentication. Here are the features that use remote authentication:

- 802.1x port-based network access control. This feature lets you increase network security by requiring that network users log on with user names and passwords before the switch will forward their packets. This feature is described in Chapter 16, “Setting 802.1x Port-based Network Access” on page 175.
- Remote manager accounts. This feature lets you add manager accounts to the switch by transferring the task of authenticating the accounts from the switch to an authentication server on your network. This feature is described in “Managing User Accounts” on page 45.

The RADIUS client supports both features, but the TACACS+ client supports only the remote manager accounts feature. Here are the guidelines:

- Only one client can be active on the switch at a time.
- If you want to use just the remote manager account feature, you can use either RADIUS or TACACS+ because both clients support that feature.
- If you want to use 802.1x port-based network access control, you have to use the RADIUS client because the TACACS+ client does not support that feature.

Remote Manager Accounts

The switch comes with one local manager account. The account is referred to as a local account because the switch authenticates the user name and password when a manager uses the account to log on. If the user name and password are valid, the switch allows the individual to access its management software. Otherwise, it cancels the login to prevent unauthorized access.

There are two ways to add more manager accounts. The first way is to create additional local accounts.This is explained in the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- Chapter 66: Local Manager Accounts
- Chapter 67: Local Manager Account Commands

The second way to add more accounts is with a RADIUS or TACACS+ authentication server on your network. With either authentication method, the authentication of the user names and passwords of the manager accounts is performed by one or more authentication servers. The switch

forwards the information to the servers when managers log on. The following steps illustrate the authentication process that occurs between the switch and an authentication server when a manager logs on:

1. The switch uses its RADIUS or TACACS+ client to transmit the user name and password to an authentication server on the network.
2. The server checks to see if the user name and password are valid.
3. If the combination is valid, the authentication server notifies the switch, which completes the login process, allowing the manager access to its management software.
4. If the user name and password are invalid, the authentication protocol server notifies the switch, which cancels the login.

Configuring TACACS+ and RADIUS

You configure the authentication method and the authentication server, or servers, with the following procedures:

- "Selecting the Authentication Method" on page 166
- "Configuring the Authentication Server" on page 168

The order in which you configure the authentication method and the authentication server does not matter. However, you must configure both of these procedures to have an authentication server that is actively attached to your switch.

You can configure up to three servers each for the RADIUS and TACACS+ features. However, only one authentication method and one server is active at a time.

If you configure three authentication servers, the switch queries the servers in the order in which they are listed in its table, starting with 1. As a result, the server that you assign a priority of 1 is used first to authenticate the switch. If that server goes down, then the server assigned a priority of 2 is used to authenticate the switch. If the server with a priority 2 goes down, then the server with a priority of 3 is used to authenticate the switch. If the server with a priority of 3 goes down, there is no authentication on the switch.

Selecting the Authentication Method

To choose either RADIUS or TACACS+ as the authentication method for the switch, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **Authentication Servers**.

   The Authentication Server Configuration page is displayed. By default, the TACACS+ tab is selected. See Figure 55.

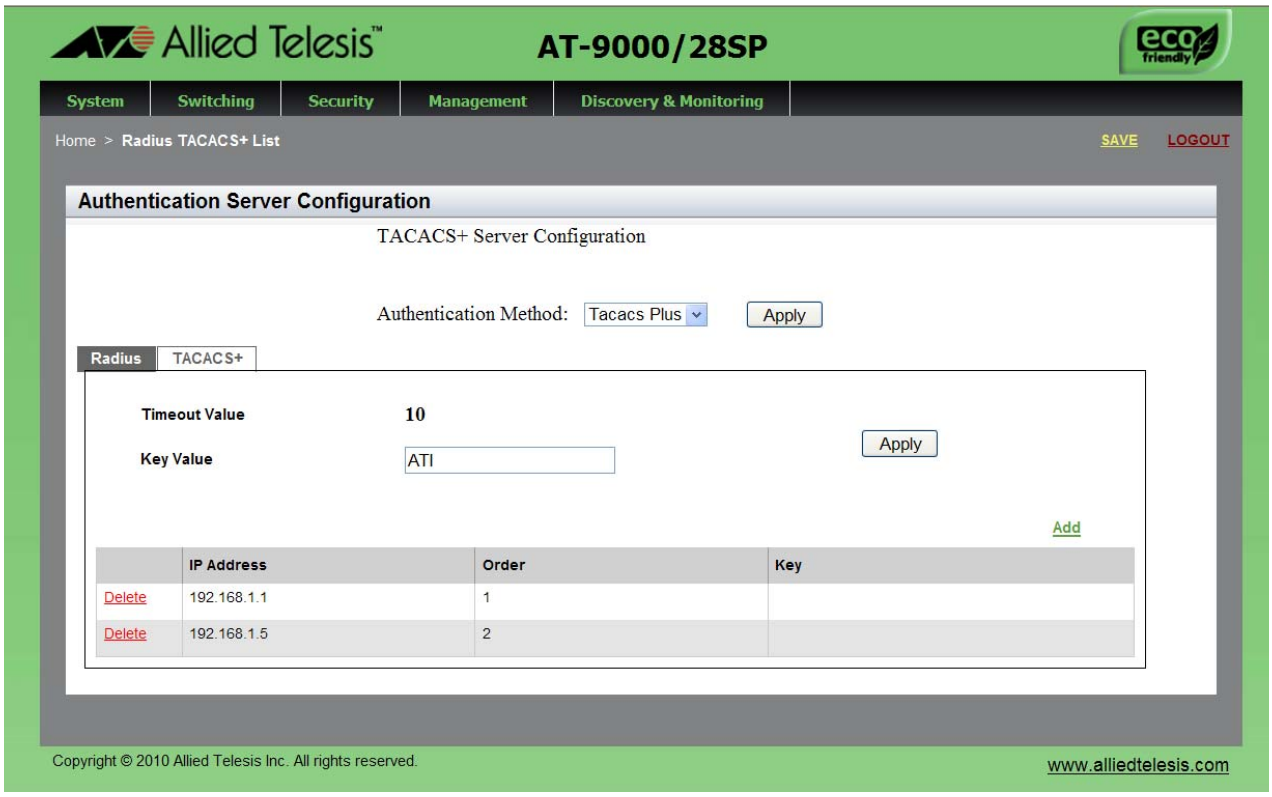


Figure 55. Authentication Server Configuration Page with TACACS+ Tab

3. Use the pull-down menu next to the Authentication Method field to choose from the following:

   - **None**— Indicates there is no authentication method assigned to the switch.
   - **Tacacs Plus**— Selects Tacacs+ as the authentication method.
   - **Radius**— Selects RADIUS as the authentication method.

4. Click **Apply**.

   Choose the Apply button nearest the Authentication Method pull-down menu.

Configuring the Authentication Server

To configure an authentication server, choose from the following procedures:

- “Configuring a TACACS+ Server” on page 168
- “Configuring a RADIUS Server” on page 170

Note
Before you can configure an TACACS+ or RADIUS server, you must select an authentication method. See “Selecting the Authentication Method” on page 166.

Configuring a TACACS+ Server

To configure a TACACS+ server, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **Authentication Servers**.

   The Authentication Server Configuration page is displayed. See Figure 55 on page 166.

3. Click the **Tacacs+** tab.

   The Authentication Server Configuration Page with the Tacacs+ tab is displayed. See Figure 55 on page 166.

   Note
   You cannot change the **Timeout Value** for a TACACS+ server. This field indicates the number of seconds, that the switch waits for a response from a TACACS+ server to an authentication request, before querying the next server in the list.

4. Specify the **Key Value** setting as needed.

   This field defines the value of the global encryption key of the TACACS+ servers. You can define a global encryption key if you have one TACACS+ server or if there is more than one server and they all use the same encryption key. This value is used by the TACACS+ clients. The maximum length is 39 characters. Spaces and special characters are not permitted.The default value is “ATI.”

Note
To define two or three servers that use different encryption keys, do not enter a global encryption key value on this web page. Instead, define the individual keys when you add the IP addresses of the servers to the client on the TACACS+ Add Page. See the following steps.

5. Click **Apply**.

   Choose the Apply button nearest the Key Value field.

6. Click **Add** at the bottom of the page.

   The Tacacs Add page is displayed. See Figure 56.

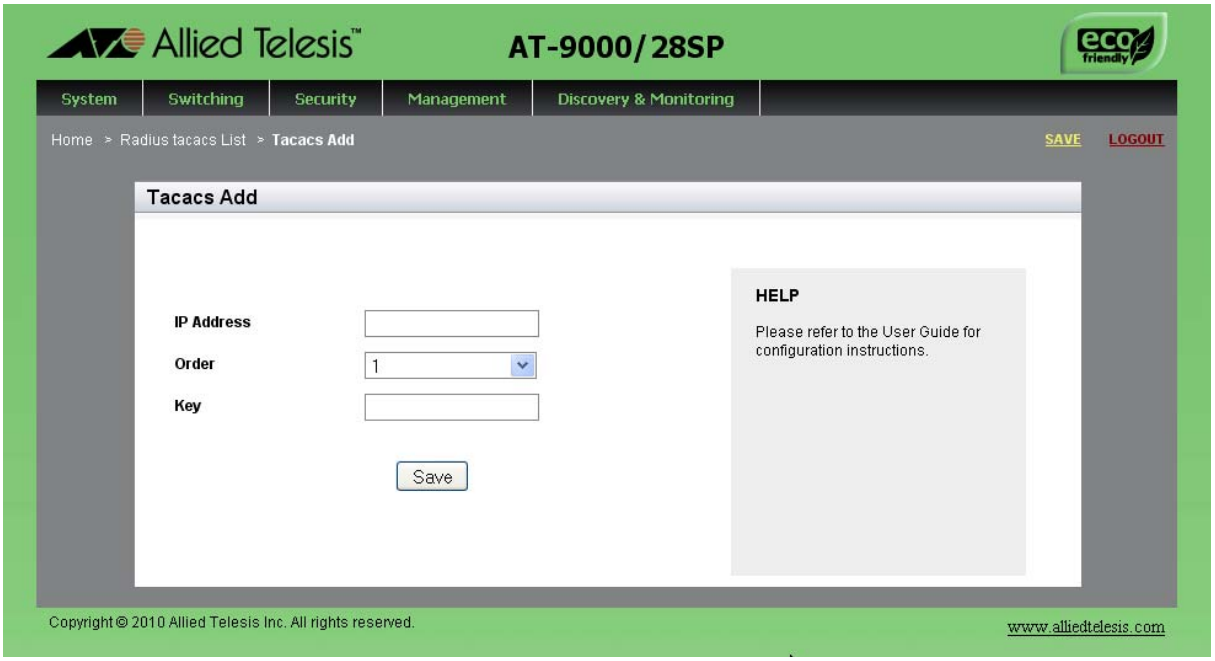


Figure 56. Tacacs Add Page

7. Change the following settings as needed:

   - **IP Address**— Enter the IP address of the TACACS+ server. The IP address must be in the following IPv4 format: xxx.xxx.xxx.xxx.
   - **Order**— Select an index number for the IP address which indicates the priority of the TACACS+ server. The switch queries the servers in the order in which they are listed in its table, starting with 1. The range is 1 to 3.

- **Key**— Enter the secret key for this TACACS+ server. The maximum length is 39 characters. Spaces and special characters are not permitted. This value is needed when you configure a TACACS+ client.

8. Click **Save**.

Configuring a RADIUS Server

To configure the RADIUS server, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **Authentication Servers**.

   The Authentication Server Configuration page is displayed. See Figure 55 on page 166.

3. Click the **RADIUS** tab.

   The Authentication Server Configuration page with the Radius tab selected is displayed. See Figure 57.

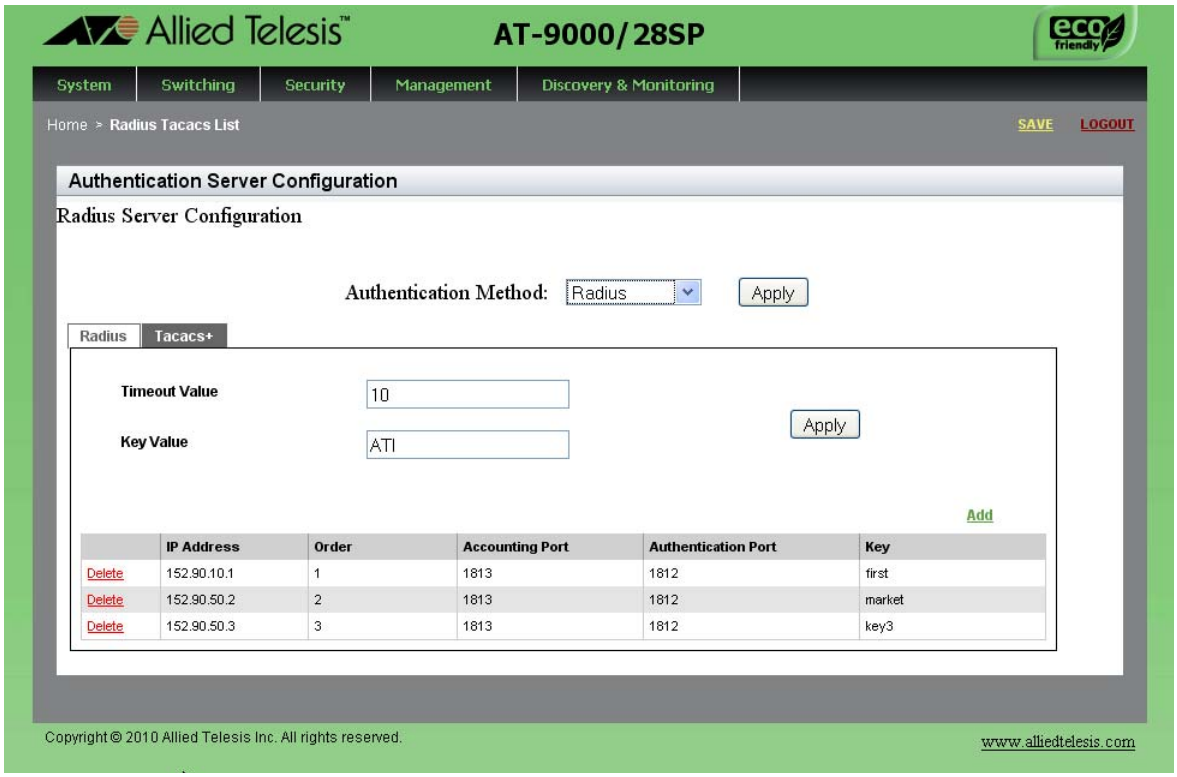


Figure 57. Authentication Server Configuration Page with Radius Tab

4. Change the following fields as needed:

   - **Timeout Value**— Indicates the length of the time, in seconds, that the switch waits for a response from a RADIUS server to an authentication request, before querying the next server in the **list.The default value is 10.**
   - **Key Value**— Indicates the value of the global encryption key of the RADIUS servers. You can define a global encryption key if you have one RADIUS server or if there is more than one server and they all use the same encryption key. This value is used by the RADIUS clients. The maximum length is 39 characters. Spaces and special characters are not permitted. The default value is "ATI."

   Note
   To define two or three servers that use different encryption keys, do not enter a global encryption key value on this web page. Instead, define the individual keys when you add the IP addresses of the servers to the client on the RADIUS Server Configuration Page. See the following steps.

5. Click Add.

   The Radius Server Configuration page is displayed. See Figure 58.

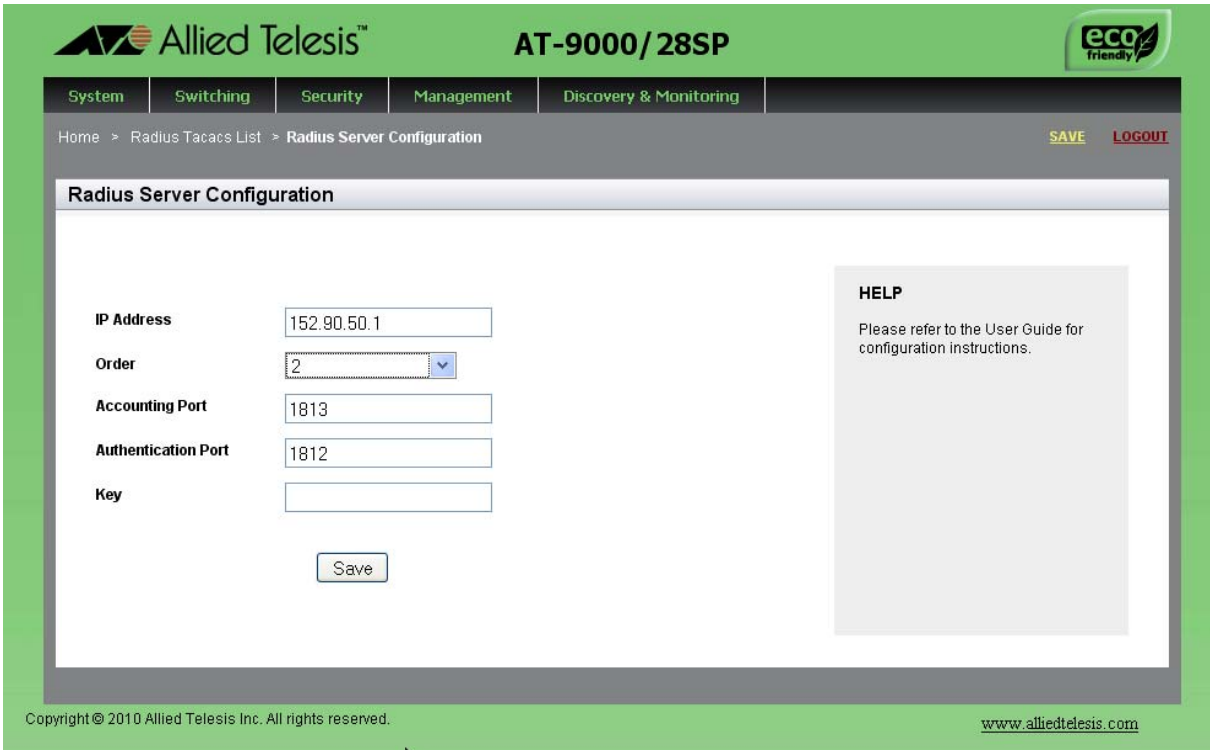


Figure 58. Radius Server Configuration Page

6. Change the following settings as needed:

   - **IP Address**— Specifies the IP address of a RADIUS server on the network. The IP address must be in the following IPv4 format: xxx.xxx.xxx.xxx.
   - **Order**— Select an index number for the IP address which indicates the priority of the RADIUS server. The switch queries the servers in the order in which they are listed in its table, starting with 1. The range is 1 to 3.
   - **Accounting Port**— Select the accounting port for the RADIUS server. This is the UDP destination port for RADIUS accounting requests. If you select 0, the server is not used for accounting. By default, the UDP port for accounting is 1813.
   - **Authentication Port**— Specifies the UDP destination port for RADIUS authentication requests. If you select 0, the server is not used for authentication. The default UDP port for authentication is 1812.
   - **Key**— Specifies the encryption key used by this RADIUS server. This value is needed when you configure a RADIUS client. The maximum length is 39 characters. Spaces and special characters are not permitted.

7. Click **Save**.

Deleting an Authentication Server

To delete either an TACACS+ or RADIUS authentication server, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **Authentication Servers**.

   The Authentication Server Configuration page is displayed. See Figure 55 on page 166.

3. Click either the TACACS+ or the RADIUS tab, depending on the type of server you want to delete.

   For example, see the RADIUS Server Configuration Page with Servers in Figure 58 on page 171.

4. Click **Delete** next to the server that you want to delete.

Chapter 16

Setting 802.1x Port-based Network Access

This chapter provides a brief description of the 802.1x Port-based Authentication feature and explains how to enable this feature on the switch, and configure authentication on a port.

See the following sections:

- “Overview” on page 176
- “Enabling 802.1x Port-based Authentication on the Switch” on page 177
- “Configuring 802.1x Port-based Authentication” on page 178
- “Displaying the 802.1x Authentication Port Settings” on page 183
- “Disabling 802.1x Port-based Authentication on the Switch” on page 184
- “Disabling 802.1x Port-based Authentication on a Port” on page 185

For more information about the 802.1x features, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- Chapter 50: 802.1x Port-based Network Access Control
- Chapter 51: 802.1x Port-based Network Access Control Commands

Overview

The 802.1x port-based network access control feature lets you control who can send traffic through and receive traffic from the individual switch ports. The switch does not allow an end node to send or receive traffic through a port until the user of the node has by authenticated by a RADIUS server.

This port-security feature is used to prevent unauthorized individuals from connecting a computer to a switch port or using an unattended workstation to access your network resources. Only those users designated as valid network users on a RADIUS server are permitted to use the switch to access the network.

This port security method uses the RADIUS authentication protocol. The management software of the switch includes RADIUS client software. As mentioned in Chapter 15, “Setting RADIUS and TACACS+ Clients” on page 163, you can use the RADIUS client software on the switch, along with a RADIUS server on your network, to create new remote manager accounts.

Note
RADIUS with Extensible Authentication Protocol (EAP) extensions is the only supported authentication protocol for 802.1x port-based network access control. This feature is not supported with the TACACS+ authentication protocol.

Here are several terms to keep in mind when using this feature:

- Supplicant— A supplicant is an end user or end node that wants to access the network through a switch port. A supplicant is also referred to as a client.
- Authenticator— The authenticator is a port that prohibits network access until a supplicant has logged on and been validated by the RADIUS server.
- Authentication server— The authentication server is the network device that has the RADIUS server software. This is the device that does the actual authenticating of the supplicants.

The switch does not authenticate any supplicants connected to its ports. It’s function is to act as an intermediary between the supplicants and the authentication server during the authentication process.

Enabling 802.1x Port-based Authentication on the Switch

To enable the 802.1x port-based Authentication feature on a switch, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **802.1x Port Authentication**.

   The 802.1x Authentication page is displayed. See Figure 59

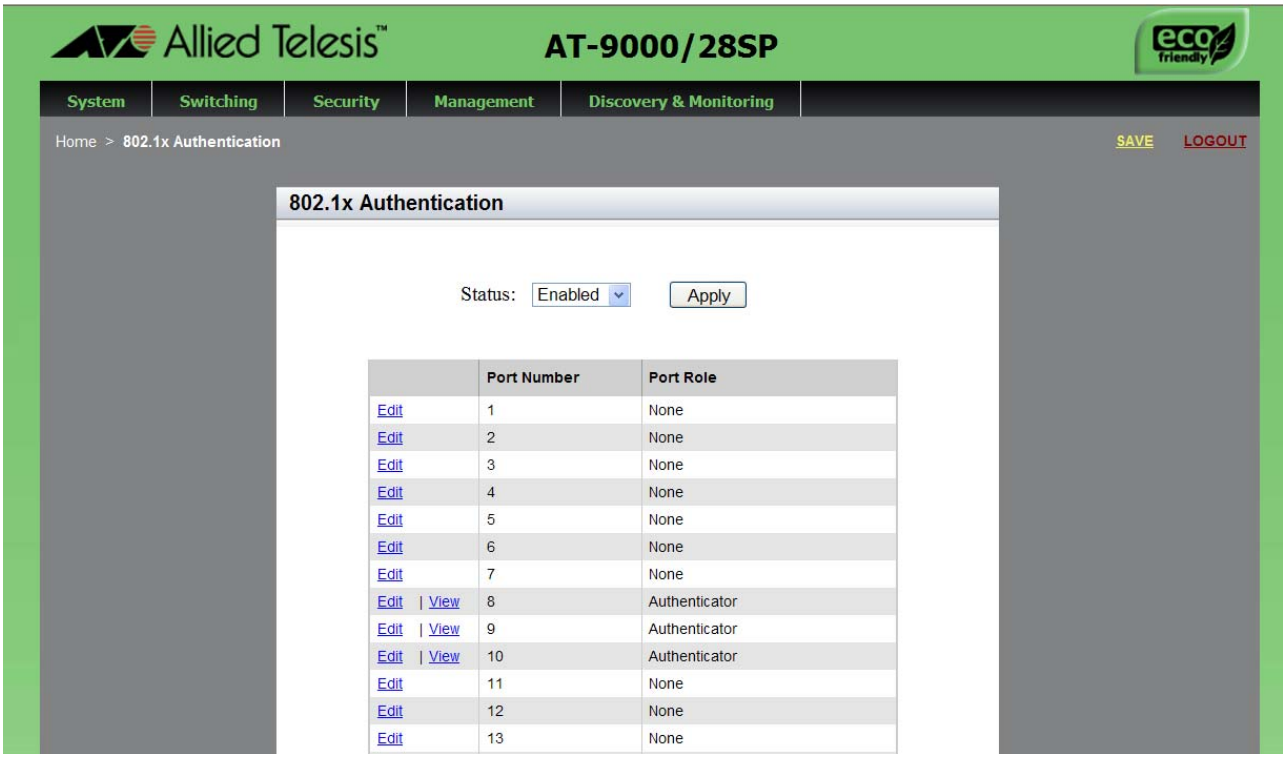


Figure 59. 802.1x Authentication Page

3. Use the pull-down menu next to the Status field to select "Enabled."

   This is the default setting.

4. Click **Apply**.

Configuring 802.1x Port-based Authentication

To configure 802.1x port authentication on a port, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **802.1x Port Authentication**.

   The 802.1x Authentication page is displayed. See Figure 59 on page 177.

3. Click Edit next to the port that you want to modify.

   The Modify 802.1x Authentication page is displayed. See Figure 60.

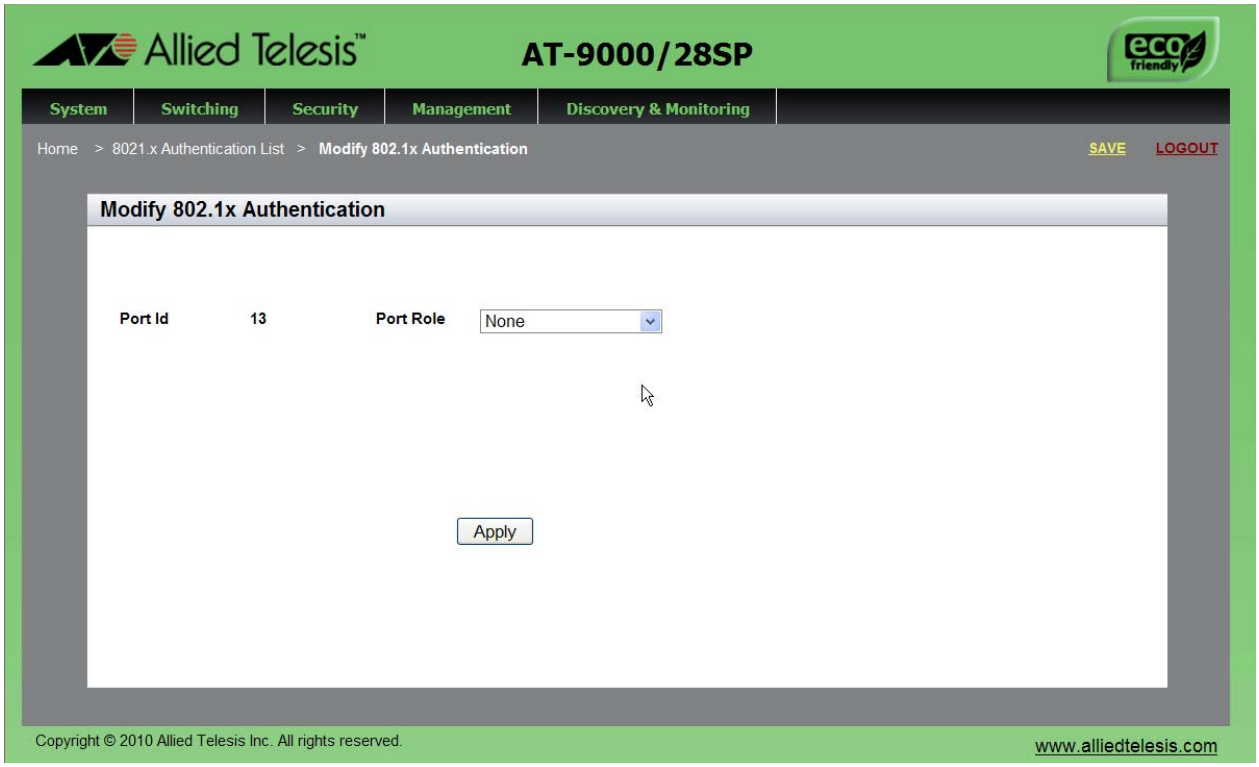


Figure 60. Modify 802.1x Authentication Page

4. Use the pull-down menu next to the **Port Role** field to select "Authenticator."

The Modify 802.1x Authentication page "Authenticator" expands. See Figure 61.

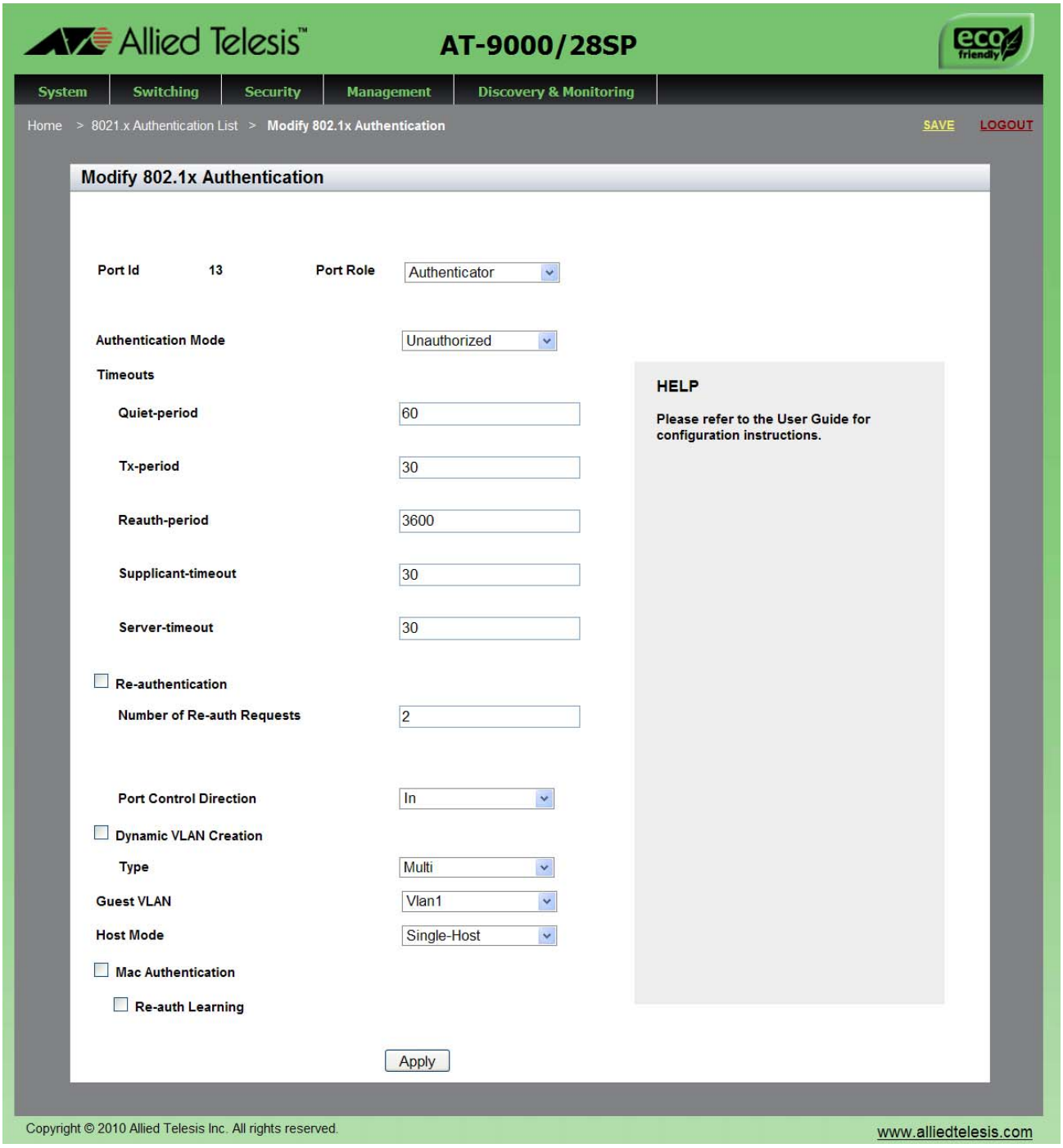


Figure 61. Modify 802.1x Authentication Page Expanded

5. Modify the following fields as needed:

   - **Port Id**— Indicates the port number.
   - **Port Role**— Indicates that you've selected the port as an Authenticator.
   - **Authentication Mode**— Indicates the authentication mode. Choose from the following:

Unauthorized	Sets the port to the 802.1x authenticator role, in the unauthorized state. Although the port is in the authenticator role, the switch blocks all authentication on the port. If you set all the ports on the switch to this setting, then no clients can log on and forward packets through them.
Force-authorized	Sets port to the 802.1x authenticator role, in the force-authorized state. A port in the force-authorized state transitions to the authorized state without any authentication exchanges required. The port transmits and receives traffic normally without 802.1X-based authentication of the clients.
Auto	Sets the port to the 802.1X port-based authenticator role. A port in this state begins in the unauthorized state, forwarding only EAPOL frames, until a client has logged on successfully.

Timeouts

The following fields set the timers for this feature:

- **Quiet Period**— Sets the number of seconds that an authenticator port remains in the quiet state following a failed authentication exchange with a client. The range is 0 to 65,535 seconds. The default value is 60 seconds.
- **Tx-period**— Sets the number of seconds an authenticator port waits for a response to an EAP-request/identity frame from a client before retransmitting the request. The default value is 30 seconds. The range is 1 to 65,535 seconds.
- **Reauth-period**— Specifies the time interval that an authenticator port requires a client to reauthenticate. The range is 1 to 65,535 seconds. The default value is 4,294,967,295 seconds.

- **Supplicant-timeout**— Sets the timer used by the switch to determine authentication server timeout conditions. The range is 1 to 600 seconds. The default value is 30 seconds.
- **Server-timeout**— Sets the timer used by the switch to determine authentication server timeout conditions. The range is 1 to 600 seconds. The default value is 30 seconds.
- **Re-authentication**— Activates reauthentication on the authenticator port. The client must periodically reauthenticate according to the time interval set with the Reauth-period timer. Click the box to activate this field.
- **Number of Re-auth Requests**— Specifies the maximum number of times the switch retransmits EAP Request packets to an client before it times out an authentication session. The range is 1 to 10 retransmissions. The default value is 2.
- **Port Control Direction**— Specifies whether authenticator ports that are in the unauthorized state should forward egress broadcast and multicast traffic. Choose from the following:

  In — Specifies that authenticator ports in the unauthorized state should forward egress broadcast and multicast traffic and discard the ingress broadcast and multicast traffic. This is the default setting.

  Both — Specifies that authenticator ports in the unauthorized state should discard both ingress and egress broadcast and multicast traffic.

- **Dynamic VLAN Creation**— Activates dynamic VLAN assignments of authenticator ports. Click the box to activate this field.
- **Type**— Activates dynamic VLAN assignments of authenticator ports. Choose from the following:

  Single — Specifies that an authenticator port forwards packets of only those supplicants that have the same VID as the supplicant who initially logged on.

  Multi — Specifies that an authenticator port forwards packets of all supplicants, regardless of the VIDs in their client accounts on the RADIUS server.

- **Guest VLAN**— Specifies the ID number of a VLAN that is the guest VLAN of an authenticator port. You can enter only one VID. The range is 1 to 5.

- **Host Mode**— Sets the operating modes on authenticator ports. Choose from the following:

Single-host	Specifies the single operating mode. An authenticator port set to this mode forwards only those packets from the one client who initially logs on. This is the default setting.
Multi-host	Specifies the multiple host operating mode. An authenticator port set to this mode forwards all packets after one client logs on. This is referred to as piggy-backing.
Multi-supplicant	Specifies the multiple supplicant operating mode. An authenticator port set to this mode requires that all clients log on.

- **Mac Authentication**— Activates MAC address-based authentication on authenticator ports. An authenticator port that uses this type of authentication extracts the source MAC address from the initial frames from a supplicant and automatically sends it as the supplicant's user name and password to the authentication server. This authentication method does not require 802.1x client software on supplicant nodes. Click the box to activate this field.
- **Re-Auth Learning**— Forces ports that are using MAC address authentication into the unauthorized state. You may use this setting to reauthenticate the nodes on authenticator ports. Click the box to activate this field.

6. Click **Apply**.

Displaying the 802.1x Authentication Port Settings

To display the 802.1x Authentication port settings, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **802.1x Port Authentication**.

   The 802.1x Authentication page is displayed. See Figure 59 on page 177.

3. Click View next to the port that you want to display.

   The 802.1x View page is displayed. See Figure 62.

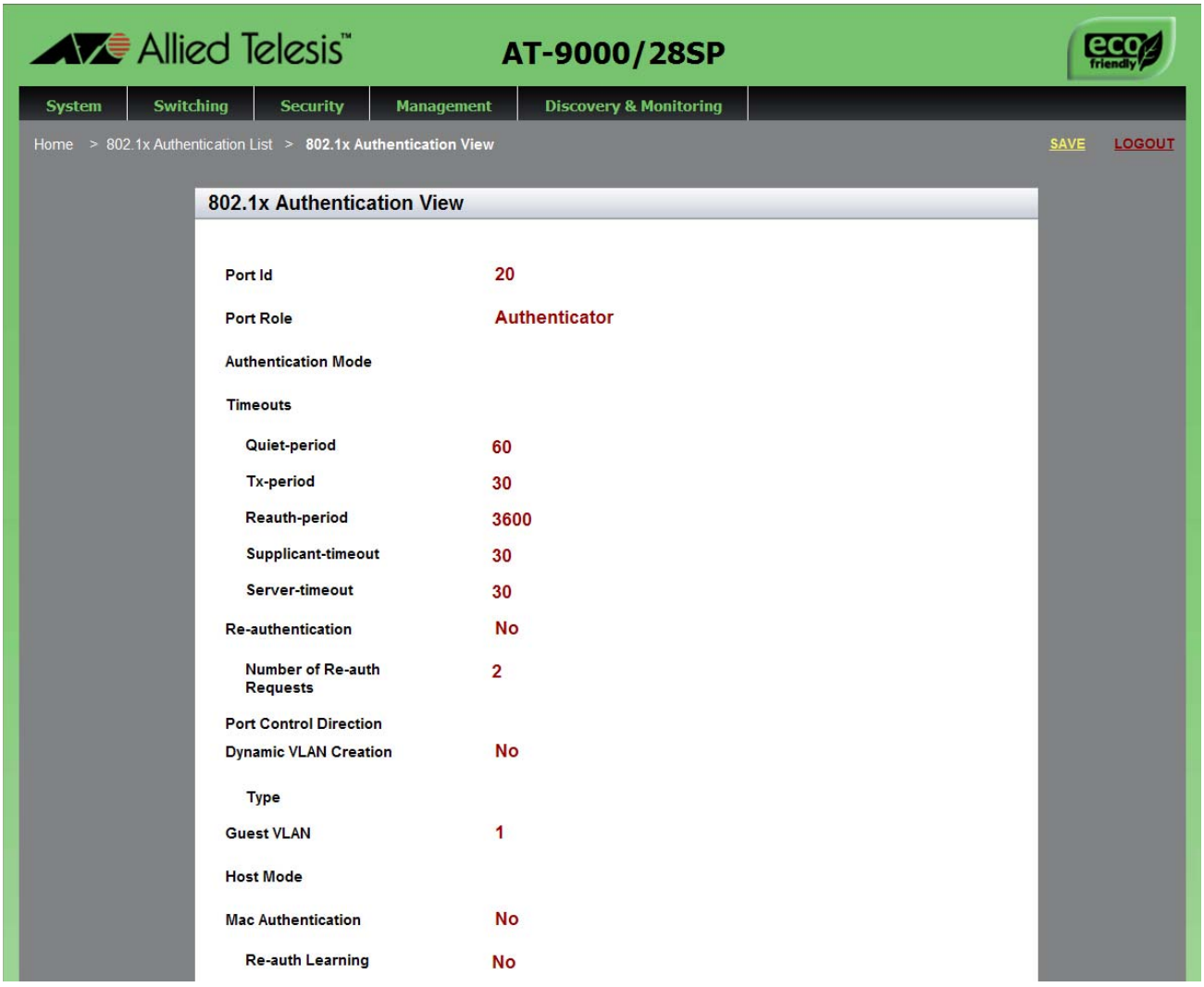


Figure 62. 802.1x View Page

Disabling 802.1x Port-based Authentication on the Switch

To disable the 802.1x port-based Authentication feature on a switch, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **802.1x Port Authentication**.

   The 802.1x Authentication page with the Status field set to “Enabled” is displayed. See Figure 59.

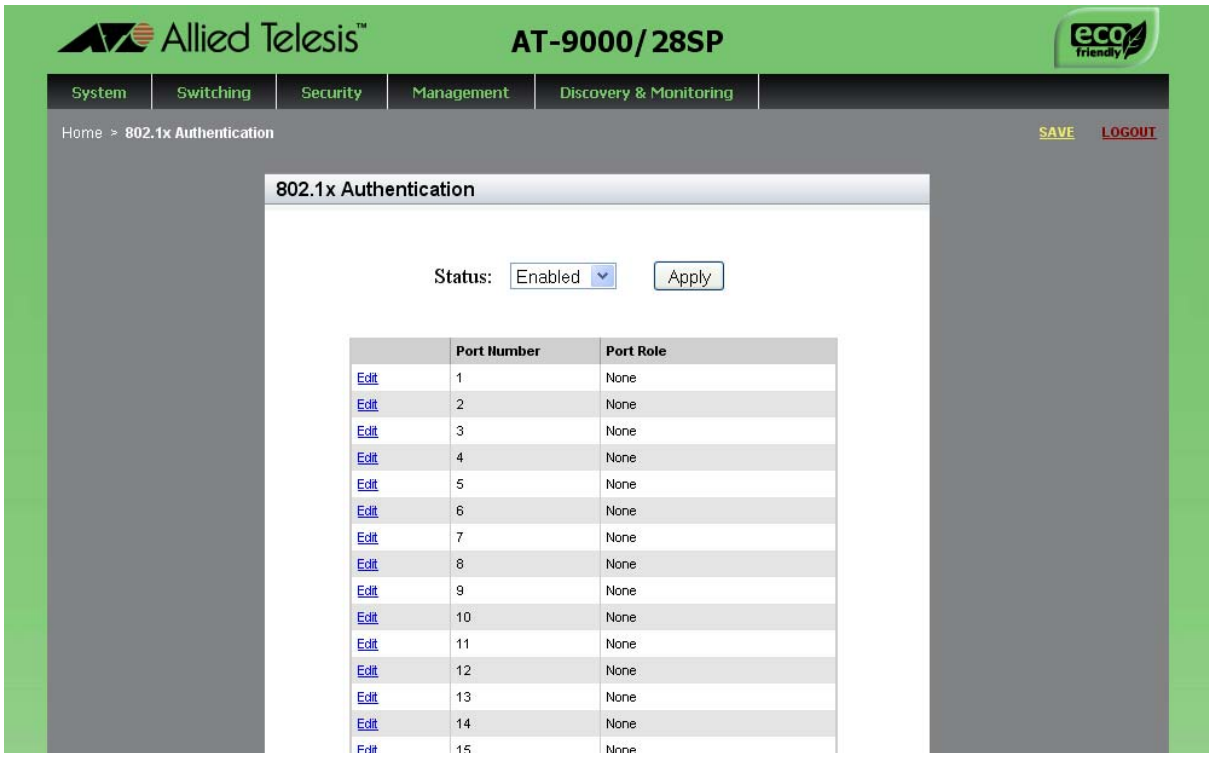


Figure 63. 802.1x Authentication Page with Status Enabled

3. Use the pull-down menu next to the **Status** field to select “Disabled.”

4. Click **Apply**.

Disabling 802.1x Port-based Authentication on a Port

To disable 802.1x port authentication on a port, do the following:

1. Select the **Security** tab.

   The Security tab is displayed. See Figure 52 on page 158.

2. From the Security tab, select **802.1x Port Authentication**.

   The 802.1x Authentication page is displayed. See Figure 59 on page 177.

3. Click Edit next to the port that you want to modify.

   The Modify 802.1x Authentication page is displayed. See Figure 60 on page 178.

4. Use the pull-down menu next to the **Port Role** field to select "None."

5. Click **Apply**.

Chapter 17

Setting IPv4 and IPv6 Management

This chapter provides brief descriptions of IPv4 and IPv6 Management and explains how to configure both types of IP addresses on the switch.

See the following sections:

- “Overview” on page 188
- “Assigning an IPv4 Address” on page 190
- “Assigning an IPv6 Address” on page 194
- “Displaying IP Addresses” on page 196
- “Deleting IP Addresses” on page 197

For more information about the IP management, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- Chapter 9: IPv4 and IPv6 Management Addresses
- Chapter 10: IPv4 and IPv6 Management Address Commands

Overview

If you use the AlliedWare Plus web interface to change the IP address of the switch, the web connection to the switch is lost. In order to maintain a connection with the switch, it is necessary to also have a local connection if you are going to change the IP address with the web interface. For information about a local connection to the switch see the *AlliedWare Plus Management Software Command Line Interface User's Guide.*

The features listed in Table 4 require that the switch is assigned a management IP address in the web interface. The switch uses the address to identify itself to other network devices, such as TFTP servers and Telnet clients.

You can assign the switch an IPv4 address and an IPv6 address, but only one of each type. However, as shown in the table, a management IPv6 address only supports the TACACS+ client. To use features that are not supported by an IPv6 address, you must assign the switch an IPv4 address instead of or, in addition to, an IPv6 address.

Note
In the Command Line Interface, there are additional features that require either an IPv4 or IPv6 address.

Table 4. Web Interface Features that Require an IP Management Address

Feature	Description	Supported by IPv4 Address	Supported by IPv6 Address
802.1x port-based network access control	Used for port security.	yes	no
RADIUS client	Used for remote management authentication and for 802.1x port-based network access control.	yes	no
sFlow agent	Used to transmit packet statistics and port counters to an sFlow collector on your network.	yes	no
TACACS+ client	Used for remote management authentication using a TACACS+ server on your network.	yes	yes

IP Management Guidelines

See the following list for guidelines about assigning the switch a management IPv4 or IPv6 address:

- You can assign the switch one IPv4 address and one IPv6 address.
- A management address must be assigned to a VLAN on the switch. It can be assigned to any VLAN, including the default VLAN which has a VID of 1. For background information on VLANs, see Chapter 11, "Setting Port-based and Tagged VLANs" on page 127.
- If you assign both IPv4 and IPv6 addresses to the switch, you must assigned them to the *same* VLAN.
- An IPv4 management address can be assigned manually or from a DHCP server on your network. (To learn the switch's MAC address, go to the Dashboard page. See Figure 4 on page 23.)
- An IPv6 address must be assigned manually. The switch does not support the assignment of an IPv6 management address from a DHCP server.
- You must assign the switch a default gateway if the network devices, such as syslog servers and Telnet workstations, are not members of the same subnet as the management address. This IP address designates an interface on a router or other Layer 3 device that represents the first hop to the remote subnets or networks where the network devices are located.
- The default gateway address, if needed, must be a member of the same subnet as the management address.

Assigning an IPv4 Address

Use one of the following procedures to assign a static or DHCP IPv4 address to the switch.

- ❒ “Assigning a Static IPv4 Address” on page 190
- ❒ “Assigning an DHCP IPv4 Address” on page 192

Assigning a Static IPv4 Address

To assign a static IPv4 address, do the following:

1. Select the **Management** tab.

   The Management tab is displayed. See Figure 64.

Figure 64. Management Tab

2. From the **Management** tab, select **IP**.

The IP Management Configuration page with the Static IP Address field selected is displayed. See Figure 65.

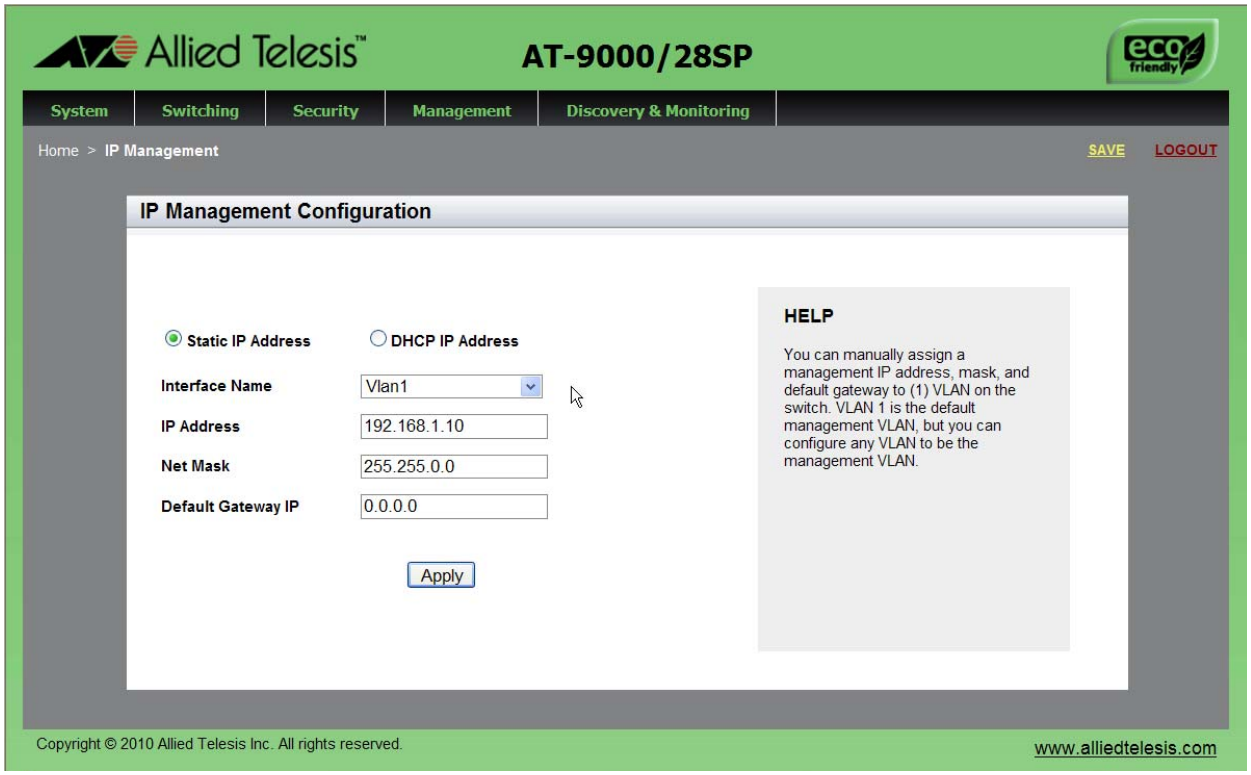


Figure 65. IP Management Configuration Page with Static IP Address

3. Click the box next to the **Static IP Address** field. This is the default setting.

4. Assign a VLAN to the IPv4 address by using the pull-down menu next to the **Interface Name** field.

   You can only select a VLAN that you have configured previously. For information about how to assign a VLAN, see Chapter 11, "Setting Port-based and Tagged VLANs" on page 127.

5. Enter an IPv4 address in the **IP Address** field in the following format:

   xxx.xxx.xxx.xxx

   where x is a number from 0 to 255. There are four groups of numbers that are separated by periods.

6. Enter a value in the **Net Mask** field to assign a subnet mask to the switch.

The Next Mask is a decimal number that represents the number of bits, from left to right, that constitute the network portion of the address. For example:

- The decimal mask 16 is equivalent to the mask 255.255.0.0.
- The decimal mask 24 is equivalent to the mask 255.255.255.0.

7. To assign a default gateway to the switch, enter an IPv4 address in the **Default IP Gateway** field.

   The IPv4 address is specified in the following format:

   xxx.xxx.xxx.xxx

   where x is a number from 0 to 255. There are four groups of numbers that are separated by periods.

   For more information about the default gateway, see “IP Management Guidelines” on page 189.

8. Click **Apply**.

Assigning an DHCP IPv4 Address

Use this procedure to assign the switch an IPv4 management address from a DHCP server. This procedure activates the DHCP client, which automatically queries the network for a DHCP server. The client also queries for a DHCP server whenever you reset or power cycle the switch.

Caution
When you use the web interface to assign an IPv4 address to the switch using DHCP, you lose connection with the switch. To maintain your connection with the switch, make sure you have a local connection to the switch when you assign an DHCP IP address.

To assign an DHCP IPv4 address, do the following:

1. Select the **Management** tab.

   The Management tab is displayed. See Figure 64 on page 190.

2. From the **Management** tab, select **IP**.

3. Click the box next to the **DHCP Address** field.

The IP Management Configuration page with the DHCP IP Address selected is displayed. See Figure 66.

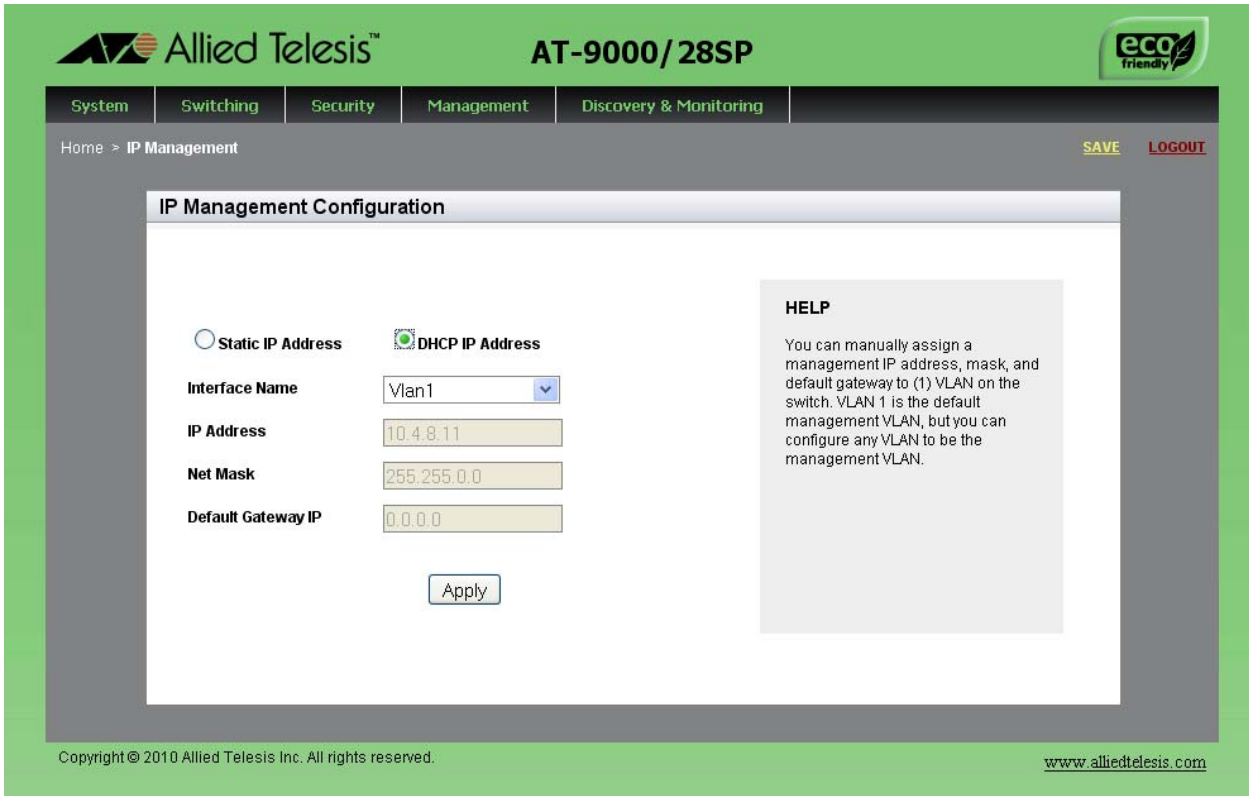


Figure 66. IP Management Configuration Page with DHCP

4. To select a VLAN, use the pull-down menu next to the **Interface Name** field.

   You can only select a VLAN that you have configured previously. For information about how to assign a VLAN, see Chapter 11, "Setting Port-based and Tagged VLANs" on page 127.

   Note
   You cannot select the **IP address**, **Net Mask**, and **Default Gateway** IP fields from this page.

5. Click **Apply**.

Assigning an IPv6 Address

To assign an IPv6 address to the switch, do the following:

1. Select the **Management** tab.

   The Management tab is displayed. See Figure 64 on page 190.

2. From the **Management** tab, select **IPv6**.

   The IPv6 Management Configuration page is displayed. See Figure 67.

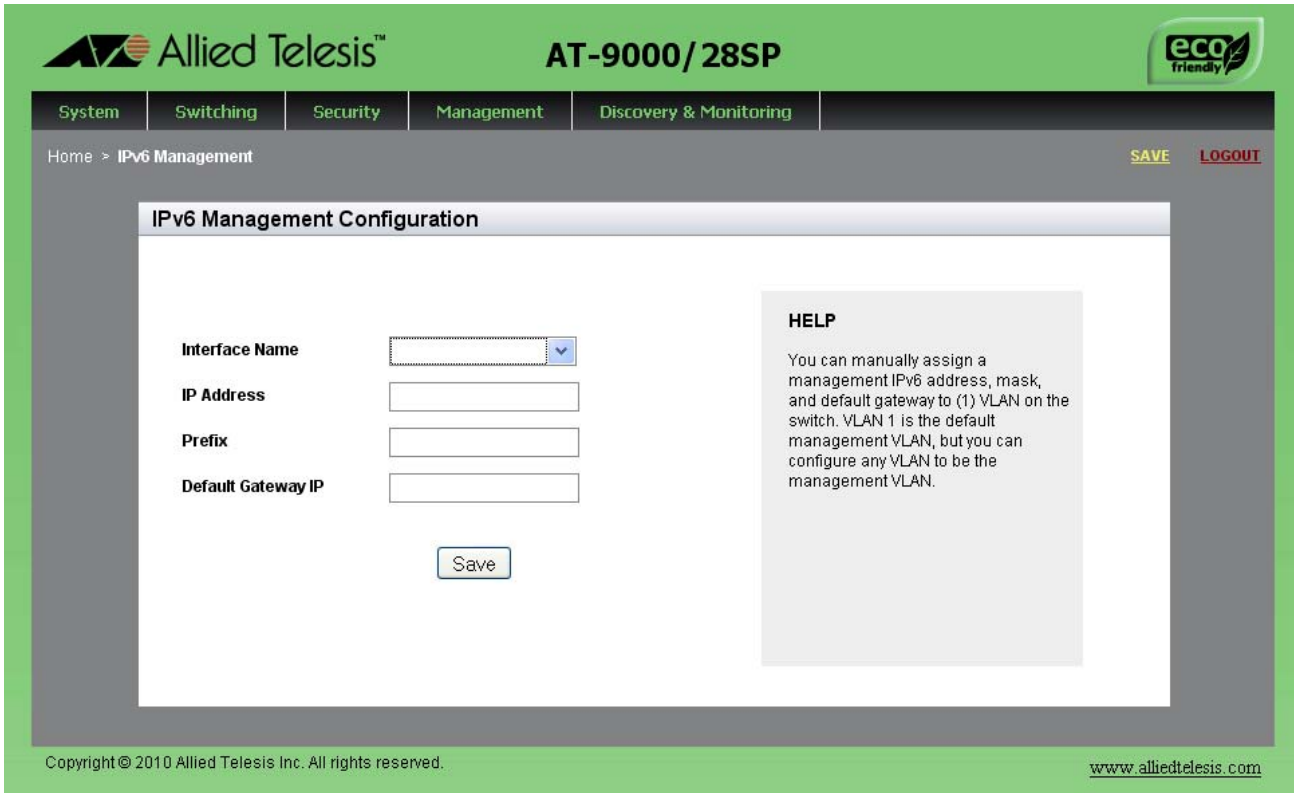


Figure 67. IPv6 Management Configuration Page

3. Assign a VLAN to the IPv6 address by using the pull-down menu next to the **Interface Name** field.

   You can only select a VLAN that you have configured previously. For information about how to assign a VLAN, see Chapter 11, “Setting Port-based and Tagged VLANs” on page 127.

4. Enter an IPv6 address in the **IP Address** field in the following format:

   nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn:nnnn

Where n is a hexadecimal digit from 0 to F. The eight groups of digits must be separated by colons. Groups where all four digits are "0" can be omitted. Leading "0's" in groups can also be omitted. For example, the following IPv6 addresses are equivalent:

12c4:421e:09a8:0000:0000:0000:00a4:1c50

12c4:421e:9a8::a4:1c50

5. To assign a prefix to the IPv6 address, enter a value in the **Prefix** field.

   The prefix is a decimal number that represents the number of bits, from left to right, that constitute the network portion of the address. (In an IPv4 address, the prefix is called the subnet mask.) For example:

   - The decimal mask 16 is equivalent to the prefix 255.255.0.0.
   - The decimal mask 24 is equivalent to the prefix 255.255.255.0.

6. To assign a default gateway to the switch, enter an IPv6 address in the **Default IP Gateway** field.

   Use this field to assign the switch an IPv6 default gateway address. A default gateway is an address of an interface on a router or other Layer 3 device. It defines the first hop to reaching the remote subnets or networks where the network devices are located. You must assign the switch a default gateway address if the following are true:

   - The remote management devices, such as Telnet workstations and TFTP servers, are not members of the same subnet as the IPv6 management address.
   - The switch can have only one IPv6 default gateway.
   - The IPv6 management address and the default gateway address must be members of the same subnet.

7. Use the following format to specify the IPv4 address:

   xxx.xxx.xxx.xxx

   where x is a number from 0 to 255. There are four groups of numbers that are separated by periods.

   For more information about the default gateway, see "IP Management Guidelines" on page 189.

8. Click **Apply**.

Displaying IP Addresses

To display the IPv4 and IPv6 addresses as well as the IPv4 and IPv6 gateway addresses assigned to the switch, go to the Dashboard page. For an example, see Figure 4 on page 23.

Deleting IP Addresses

To delete an IP address from the switch, choose on of the following procedures:

- ❒ "Deleting an IPv4 Static Address" on page 197
- ❒ "Deleting an DHCP IPv4 Address" on page 197
- ❒ "Deleting an IPv6 Address" on page 198

Caution
Deleting the IP address assigned to the switch may cause you to end the current login session and lose the connection to the web browser. To reassign an IP address to the switch, you need to use the Command Line Interface. See the *AlliedWare Plus Management Software Command Line Interface User's Guide*.

Deleting an IPv4 Static Address

To delete an IPv4 address, do the following:

1. Select the **Management** tab.

   The Management tab is displayed. See Figure 64.

2. From the **Management** tab, select **IP**.

   The IP Management Configuration page with the Static IP Address field selected is displayed. See Figure 65 on page 191

3. Delete the IP address in the **IP Address** field.

4. Click **Apply**.

Deleting an DHCP IPv4 Address

To delete an DHCP IPv4 address, do the following:

1. Select the **Management** tab.

   The Management tab is displayed. See Figure 64 on page 190.

2. From the **Management** tab, select **IP**.

   The IP Management Configuration page with DHCP IP Address selected is displayed. See Figure 66 on page 193.

3. Select **Static IP Address**.

Deleting an IPv6 Address

To delete an IPv6 address, do the following:

1. Select the **Management** tab.

   The Management tab is displayed. See Figure 64.

2. From the **Management** tab, select **IPv6**.

   The IPv6 Management Configuration page is displayed. See Figure 67 on page 194.

3. Delete the IPv6 address from the **IP Address** field.

4. Click **Apply**.

Chapter 18

Setting LLDP and LLDP-MED

This chapter provides a brief description of the Link Layer Discovery Protocol (LLDP) and Link Layer Discovery Protocol for Media Endpoint Devices (LLDP-MED) features and explains how to enable these features on the switch. See the following sections:

- ❒ “Overview” on page 200
- ❒ “Setting LLDP Locations” on page 201
- ❒ “Configuring LLDP and LLDP-MED” on page 210
- ❒ “Displaying LLDP Neighbor Information” on page 223
- ❒ “Displaying LLDP Statistics” on page 225
- ❒ “Displaying LLDP Locations” on page 228
- ❒ “Displaying LLDP and LLDP-MED Settings” on page 232
- ❒ “Disabling LLDP on the Switch” on page 238

For more information about the LLDP and LLDP-MED features, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- ❒ Chapter 50: 802.1x Port-based Network Access Control
- ❒ Chapter 51: 802.1x Port-based Network Access Control Commands

Overview

Link Layer Discovery Protocol (LLDP) and Link Layer Discovery Protocol for Media Endpoint Devices (LLDP-MED) allow Ethernet network devices such as switches and routers to receive and/or transmit device-related information to directly connected devices on the network that are also using the protocols, and to store the information that is learned about other devices. The data sent and received by LLDP and LLDP-MED are useful for many reasons. The switch can discover other devices directly connected to it. Neighboring devices can use LLDP to advertise some parts of their Layer 2 configuration to each other, enabling some types of misconfiguration to be more easily detected and corrected.

LLDP is a “one hop” protocol. LLDP information can only be sent to and received by devices that are directly connected to each other, or connected via a hub or repeater. Devices that are directly connected to each other are called *neighbors*. Advertised information is not forwarded on to other devices on the network. In addition, LLDP is a one-way protocol. That is, the information transmitted in LLDP advertisements flows in one direction only, from one device to its neighbors, and the communication ends there. Transmitted advertisements do not solicit responses and received advertisements do not solicit acknowledgements. LLDP cannot solicit any information from other devices. LLDP operates over physical ports only. For example, it can be configured on switch ports that belong to static port trunks or LACP trunks, but not on the trunks themselves, and on switch ports that belong to VLANs, but not on the VLANs themselves.

Each port can be configured to transmit local information, receive neighbor information, or both. LLDP transmits information as packets called LLDP Data Units (LLDPDUs). An LLDPDU consists of a set of Type-Length-Value elements (TLV), each of which contains a particular type of information about the device or port transmitting it.

A single LLDPDU contains multiple TLVs. TLVs are short information elements that communicate complex data, such as variable length strings, in a standardized format. Each TLV advertises a single type of information, such as its device ID, type, or management addresses.

Setting LLDP Locations

Creating LLDP locations provides allows you to create IDs that are then used in following procedures. The procedures in this section allow you to create LLDP civic, Coordinate, and ELIN locations. See the following:

- ❒ "Creating a Civic Location" on page 201
- ❒ "Creating a Coordinate Location" on page 205
- ❒ "Creating an ELIN Location" on page 207

Creating a Civic Location

To create an the LLDP Civic Location, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68.

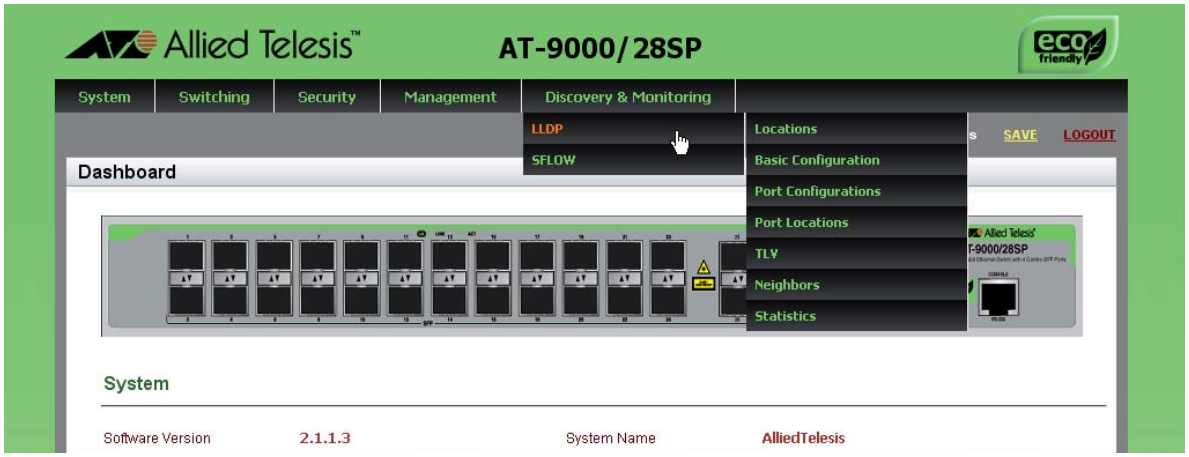


Figure 68. Discovery & Monitoring Tab

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab, select **Locations**.

The Locations tab is displayed. See Figure 69.

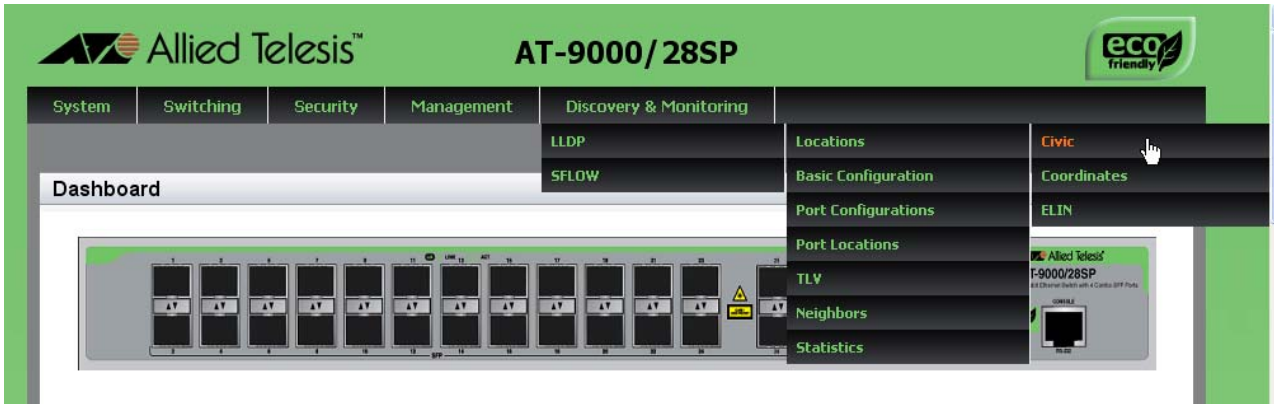


Figure 69. Locations Tab

4. From the Locations tab, select **Civic**.

   The LLDP Civic Location page is displayed. See Figure 70.

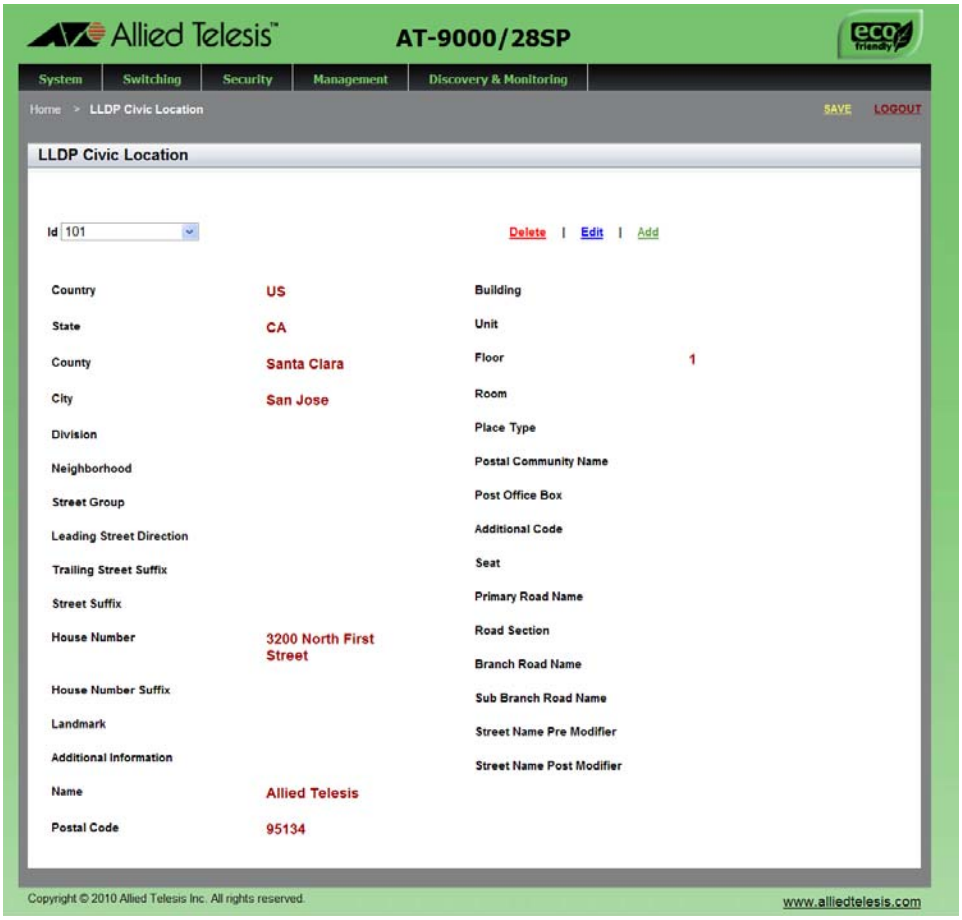


Figure 70. LLDP Civic Location Page

5. Click **Add**.

   The following fields are displayed:

   - **Id**
   - **Country**
   - **State**
   - **County**
   - **City**
   - **Division**
   - **Neighborhood**
   - **Street Group**
   - **Leading Street Direction**
   - **Trailing Street Suffix**
   - **Street Suffix**
   - **House Number**
   - **House Number Suffix**
   - **Landmark**
   - **Additional Information**
   - **Name**
   - **Postal Code**
   - **Building**
   - **Unit**
   - **Floor**
   - **Room**
   - **Place Type**
   - **Postal Community Name**
   - **Post Office Box**
   - **Additional Code**
   - **Seat**
   - **Primary Road Name**
   - **Road Selection**
   - **Branch Road Name**
   - **Sub Branch Road Name**
   - **Street Name Pre Modifier**
   - **Street Name Pre Modifier**

6. Click **Apply**.

The LLDP Civic Location Page is displayed. See Figure 71 on page 204.

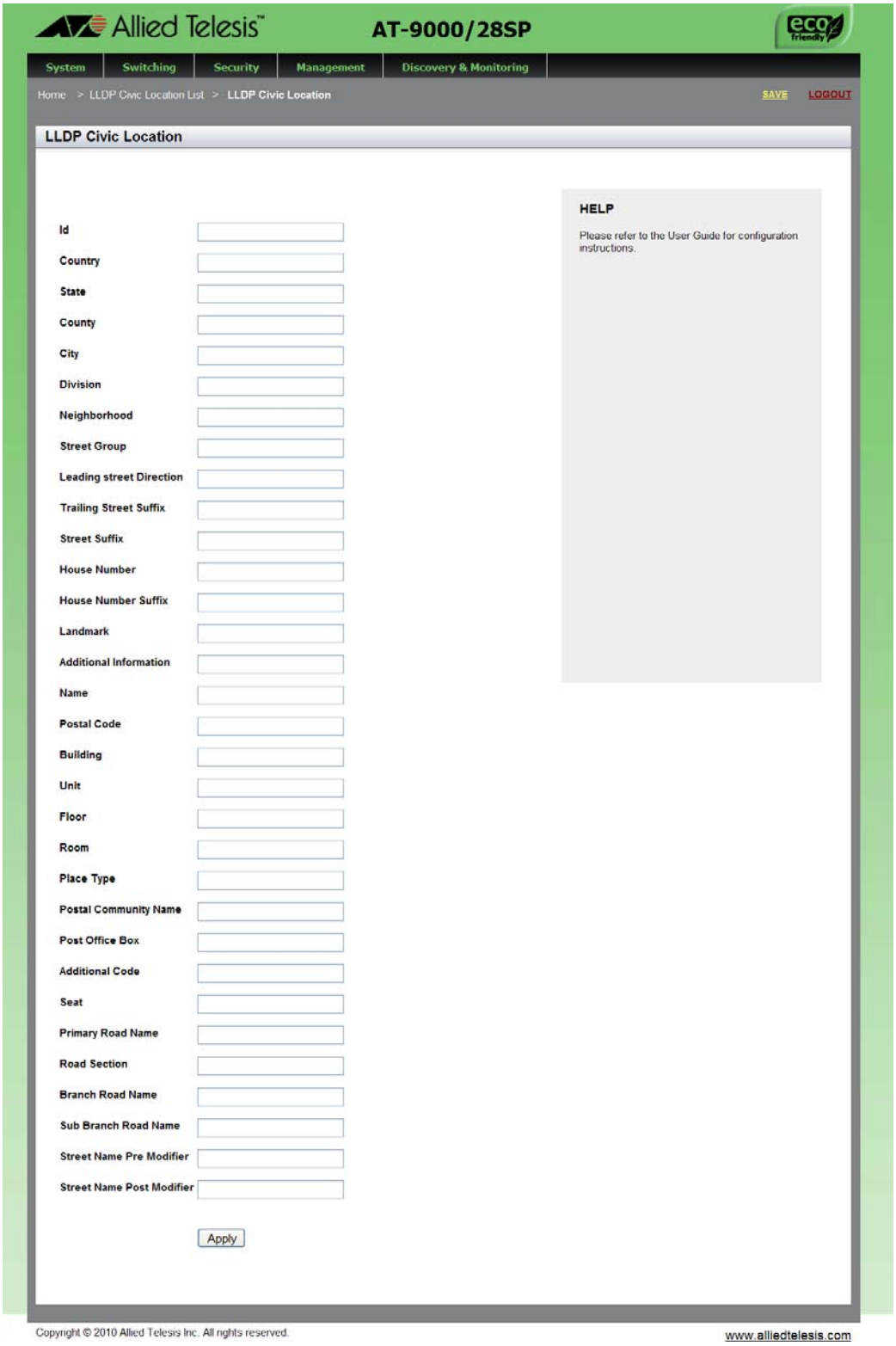


Figure 71. LLDP Civic Location Page— Modify

7. Change the fields as needed.

   You must define the **Id** and **Country** fields. The remaining fields are optional.

   The fields are listed in step 5. Each field can contain up to 255 characters.

   Note
   The Country field must contain two uppercase characters, for example, "US."

8. Click **Apply**.

Creating a Coordinate Location

To create an LLDP Coordinate Location, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab, select **Locations**.

   The Locations tab is displayed. See Figure 69 on page 202.

4. From the Location tab, select **Coordinates**.

   The LLDP Coordinate Location page is displayed. See Figure 72.

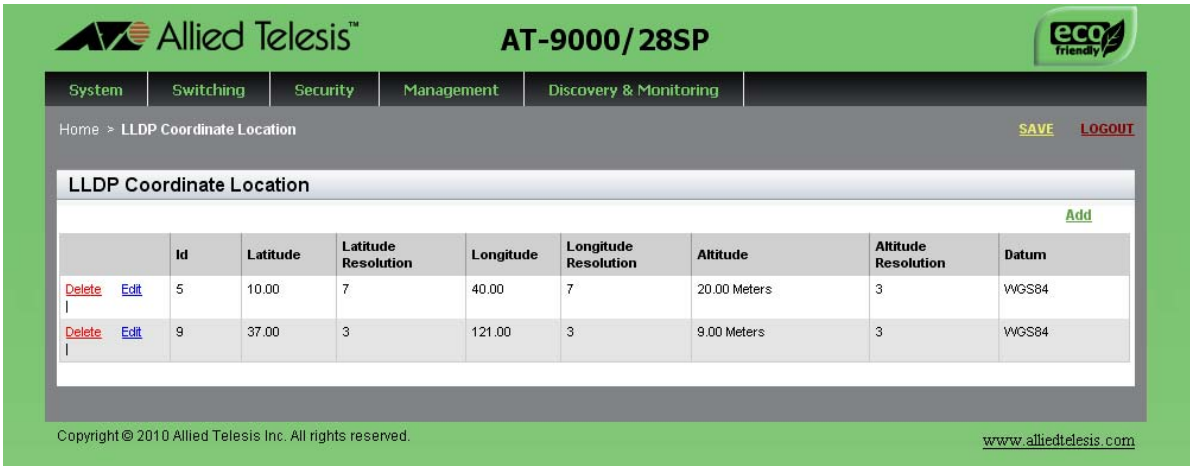


Figure 72. LLDP Coordinate Location Page

5. From the LLDP Coordinate Location page, click Add.

The LLDP Coordinate Location page is displayed. See Figure 73.

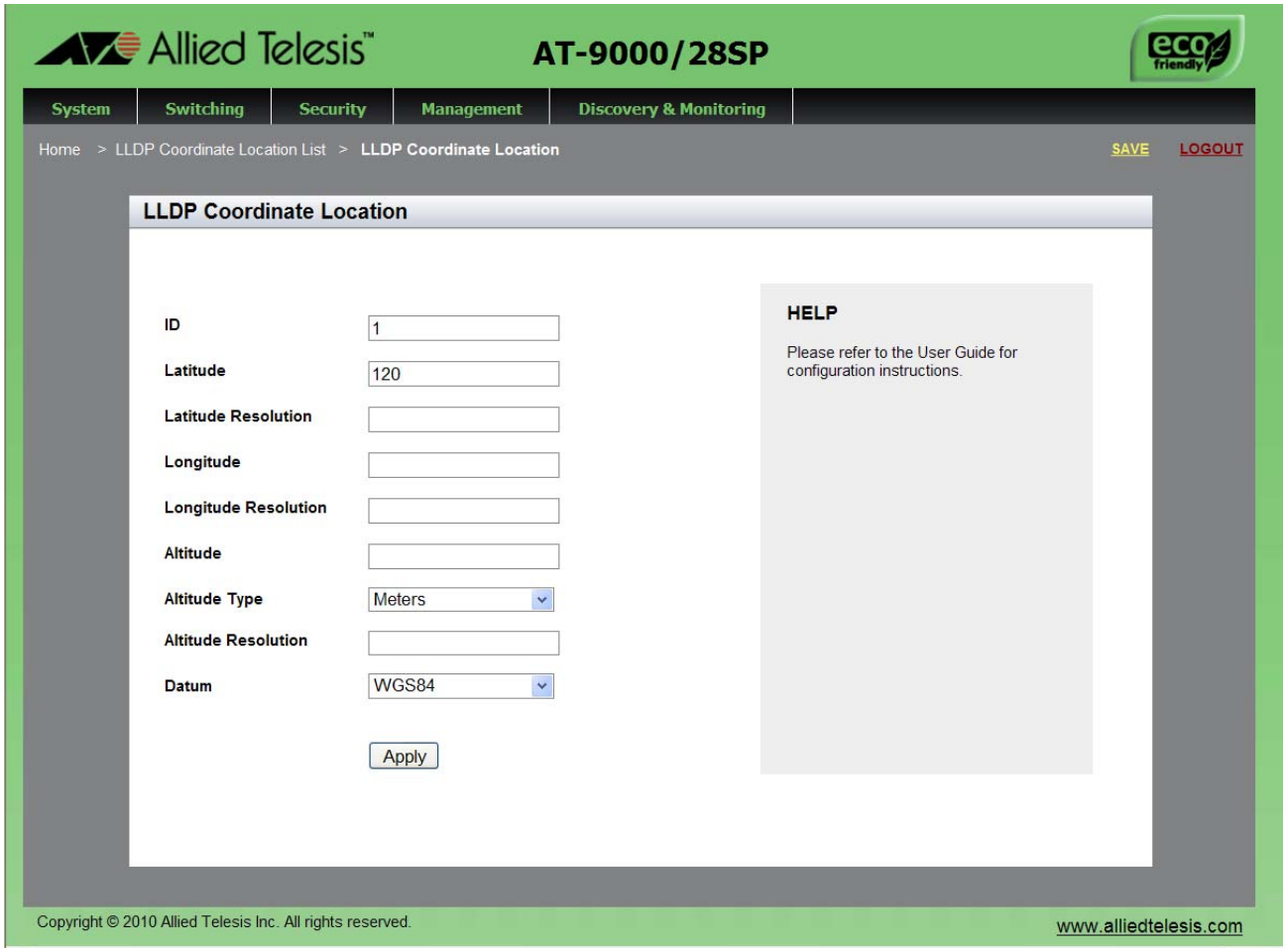


Figure 73. LLDP Coordinate Location Page— Modify

6. Change the following fields as needed:

   - **Id**— Specifies the LLDP Coordinate Location ID.
   - **Latitude**— Indicates the latitude value in decimal degrees. The range is -90.0º to 90.0º. The field accepts up to two digits to the right of the decimal point.
   - **Latitude Resolution**— Indicates the latitude resolution as the number of valid bits. The range is 0 to 34 bits.
   - **Longitude**— Specifies the longitude value in decimal degrees. The range is -180.0º to 180.0º. The field accepts up to two digits to the right of the decimal point.
   - **Longitude Resolution**— Specifies the longitude resolution as the number of valid bits. The range is 0 to 34 bits.
   - **Altitude**— Specifies the altitude in meters or floors. For the altitude in meters, the range is -2097151.0 to 2097151.0 meters. The parameter accepts up to eight digits to the right of the decimal

point. For altitude in the number of floors, the range is -2097151.0 to 2097151.0. Use the **Altitude Type** field to specify meters or floors.

- **Altitude Type**— Choose between meters and floors.
- **Altitude Resolution**— Indicates the altitude resolution as the number of valid bits. The range is 0 to 30 bits.
- **Datum**— The geodetic system (or datum) of the coordinates. Choose one of the following:

nad83-mllw	Mean lower low water datum 1983
nad83-navd	North American vertical datum 1983
wgs84	World Geodetic System 1984

7. Click **Apply**.

Creating an ELIN Location

The ELIN TLV specifies the location of a network device by its ELIN (Emergency Location Identifier Number).

To create an LLDP ELIN location, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab, select **Locations**.

   The Locations tab is displayed. See Figure 69 on page 202.

4. From the Location tab, select **ELIN**.

The LLDP ELIN Location List page is displayed. See Figure 74.

Figure 74. LLDP ELIN Location List Page

5. From the LLDP ELIN Location page, click Add.

   The LLDP ELIN Location page is displayed. See Figure 75.

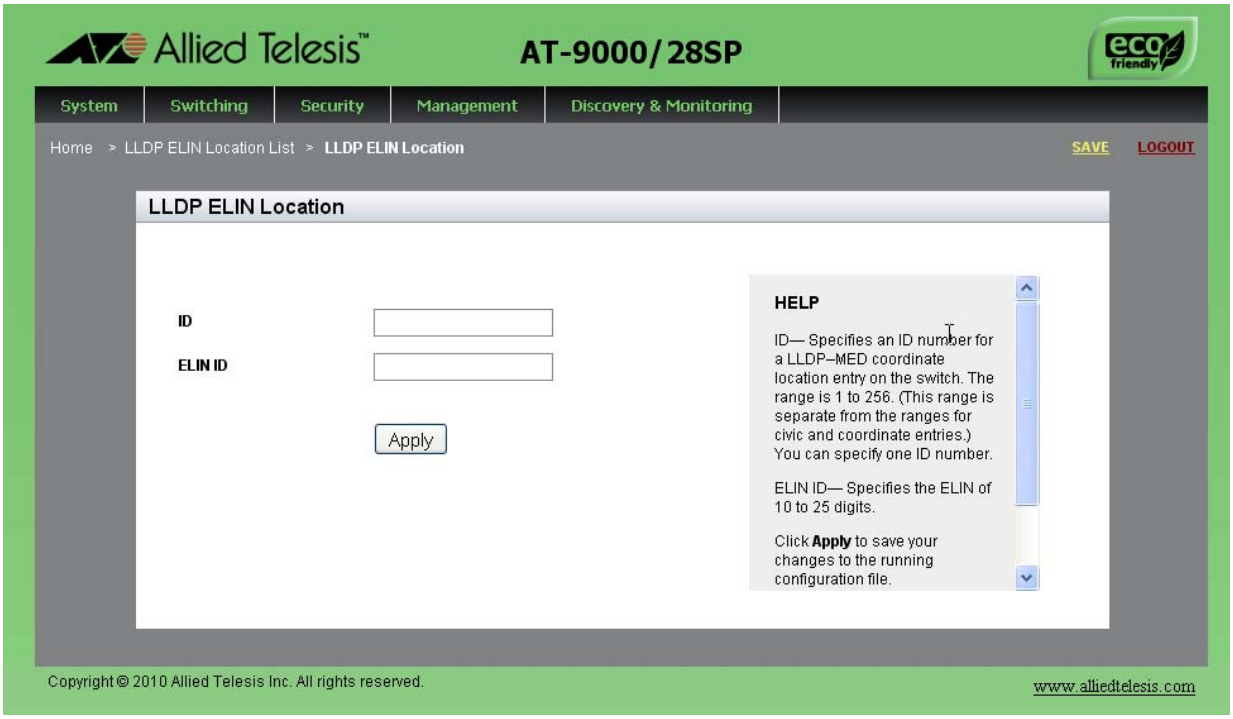


Figure 75. LLDP ELIN Location Page

6. Change the following fields as needed:

   - **Id**— Specifies an ID number for a LLDP-MED coordinate location entry on the switch. The range is 1 to 256. (This range is separate from the ranges for civic and coordinate entries.) You can specify one ID number.
   - **Elin Id**— Specifies the ELIN of 10 to 25 digits.

7. Click **Apply**.

Configuring LLDP and LLDP-MED

To configure LLDP and LLDP-MED, perform the following procedures:

- ❒ “Setting the Basic LLDP Configuration” on page 210
- ❒ “Setting LLDP Port Assignments” on page 212
- ❒ “Assigning Port Locations” on page 214
- ❒ “Enabling LLDP TLV” on page 216
- ❒ “Enabling LLDP- MED TLV” on page 220

Setting the Basic LLDP Configuration

To set the basic LLDP configuration, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears to the right.

3. From the LLDP tab, select the **Basic Configuration** tab.

The LLDP Configuration page is displayed. See Figure 76.

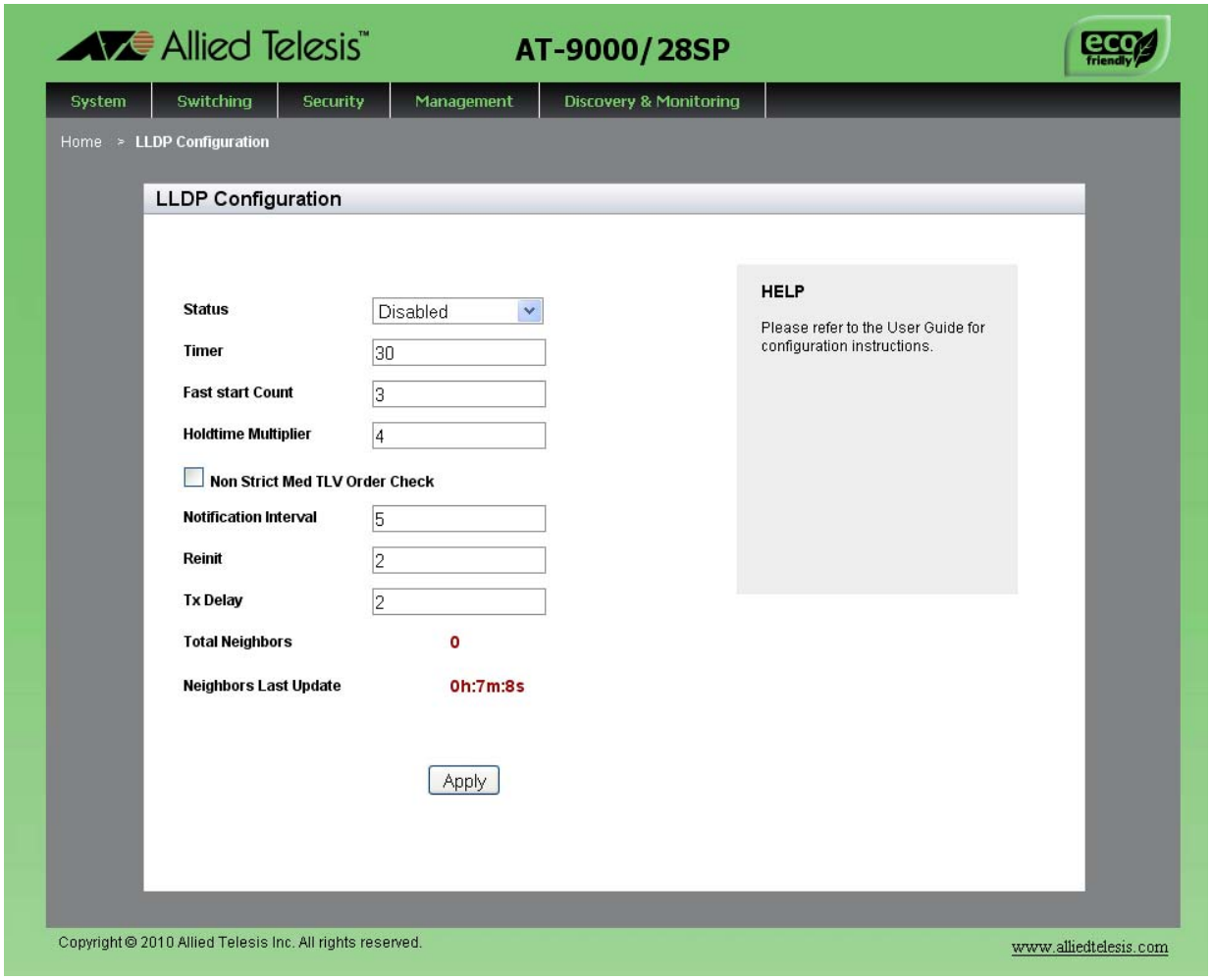


Figure 76. LLDP Configuration Page

4. Change the following fields as needed:

   - **Status**— Indicates whether LLDP is enabled or disabled on the switch. By default, LLDP is disabled on the switch.
   - **Timer**— Specifies the transmit interval. The range is 5 to 32,768 seconds.
   - **Fast Start Count**— Indicates the fast start count for LLDP-MED. The fast start count determines how many fast start advertisements LLDP sends from a port when it begins sending LLDP-MED advertisements from a port, for instance when it detects a new LLDP-MED capable device. The default value is 3.
   - **Holdtime Multiplier**— Sets the holdtime multiplier value. The transmit interval is multiplied by the holdtime multiplier to give the Time To Live (TTL) the switch advertises to the neighbors. The range is 2 to 10.

- **Non Strict Med TLV Order Check**— Sets the switch to accept LLDP-MED advertisements even if the TLVs are not in the standard order, as specified in ANSI/TIA-1057. This configuration is useful if the switch is connected to devices that send LLDP-MED advertisements in which the TLVs are not in the standard order. Click in the box next to this field to select the nonstrict Med TLV Order Check.
- **Notification Interval**— Sets the notification interval. This is the minimum interval between LLDP SNMP notifications (traps). The range is 5 to 3,600 seconds.
- **Reinit**— Sets the reinitialization delay. This is the number of seconds that must elapse after LLDP is disabled on a port before it can be reinitialized. The range is 1 to 10 seconds.
- **Tx Delay**— Specifies the transmission delay. This is the minimum time interval between transmissions of advertisements due to changes in LLDP local information.
- **Total Neighbors**— Indicates the number of LLDP neighbors the switch has discovered on all its ports. You cannot modify this field.
- **Neighbors Last Update**— Indicates the time since the LLDP neighbor table was last updated. You cannot modify this field.

5.Click **Apply**.

Setting LLDP Port Assignments

To assign LLDP to a port, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP** and then select **Port Configurations**.

The LLDP Port Config page is displayed. See Figure 77.

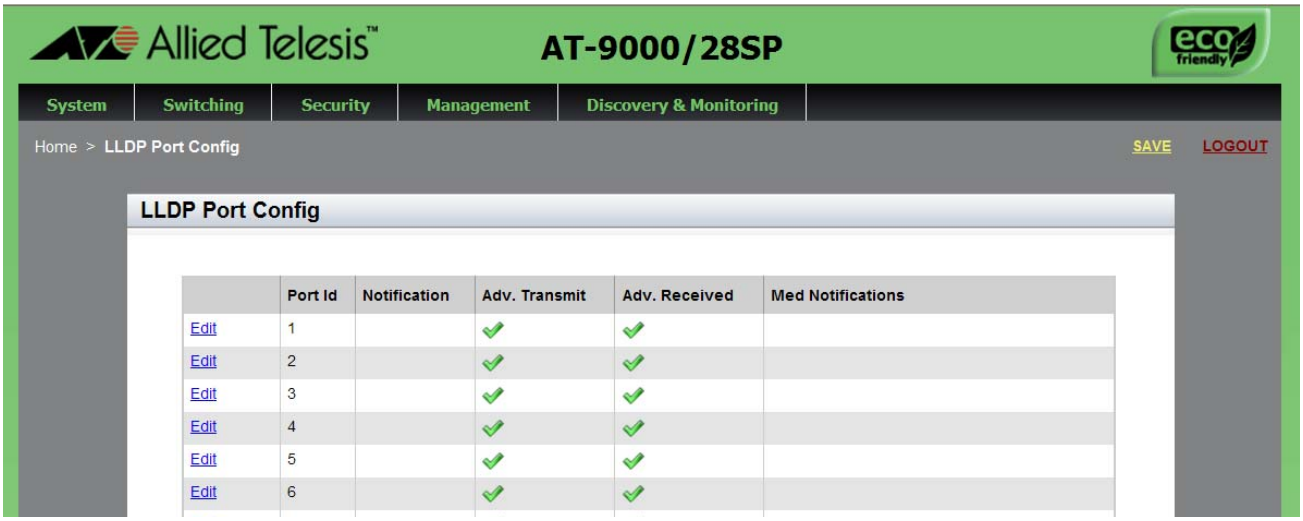


Figure 77. LLDP Port Config Page

The following fields are displayed:

- **Port Id**— Indicates the port number.
- **Notification**— Configures the switch to send LLDP-MED topology change notifications when devices are connected to or disconnected from the specified ports. By default, this field is not selected.
- **Adv. Transmit**— Configures ports to send LLDP advertisements. Ports configured to transmit LLDP advertisements send the mandatory TLVs and any optional LLDP TLVs they have been configured to send. By default, this field is selected.
- **Adv. Receive**— Configures ports to accept LLDP advertisements. Ports configured to receive LLDP advertisements accept all advertisements from their neighbors. By default, this field is selected.
- **Med Notifications**— Indicates the switch sends LLDP-MED topology change notifications when devices are connected to or disconnected from the specified ports. By default, this field is not selected.

3. Select **Edit** next to the port that you want to modify.

The Modify LLDP Port Configuration page is displayed. See Figure 78.

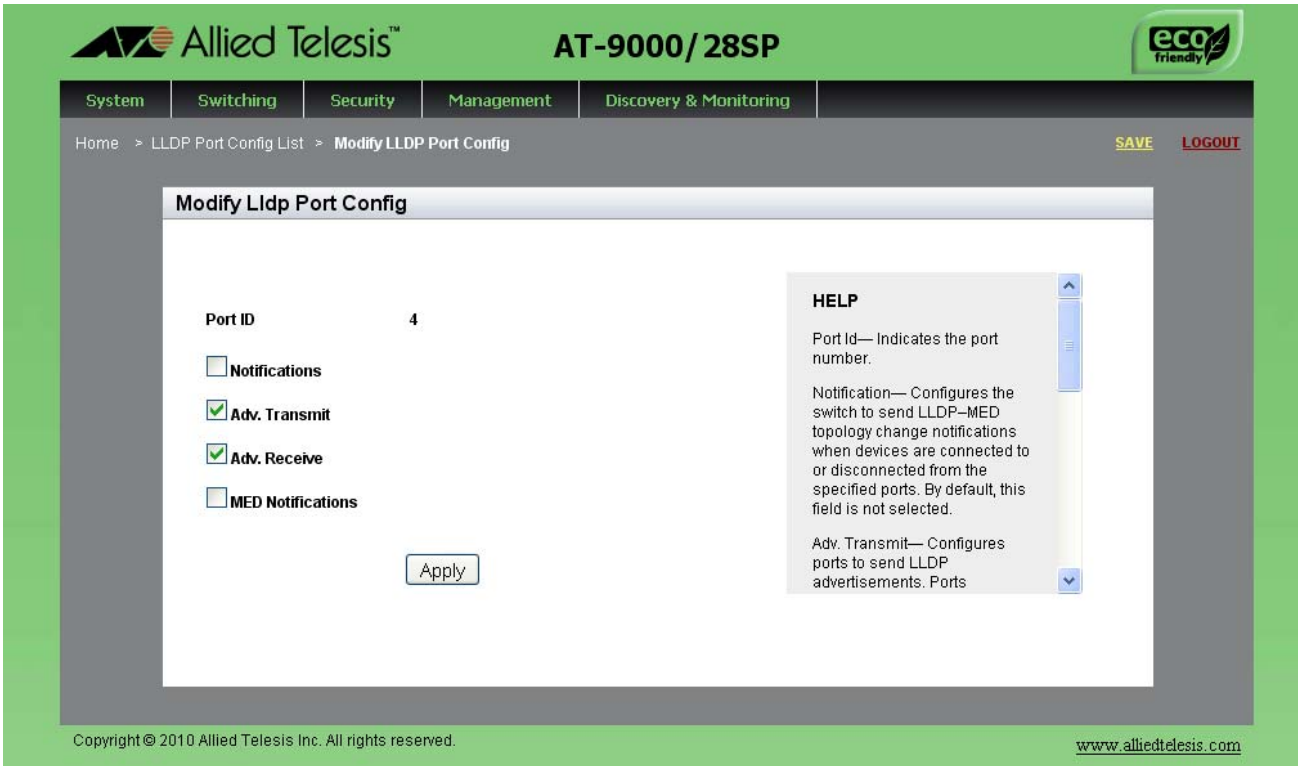


Figure 78. Modify LLDP Port Configuration Page

4. Change the settings as needed.

   The definitions are listed in step 2. Click on a field to select it.

   Note
   You cannot modify the port ID from this page. To change this field, go to the previous page.

5. Click **Apply**.

Assigning Port Locations

A port location is assigned to a Civic, Coordinate, or ELIN location ID. You must create these IDs *before* you assign a port location. For instructions, see “Setting LLDP Locations” on page 201.

To set an LLDP port location, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab**,** select **Port Locations**.

   The LLDP Port Location page is displayed. See Figure 79.

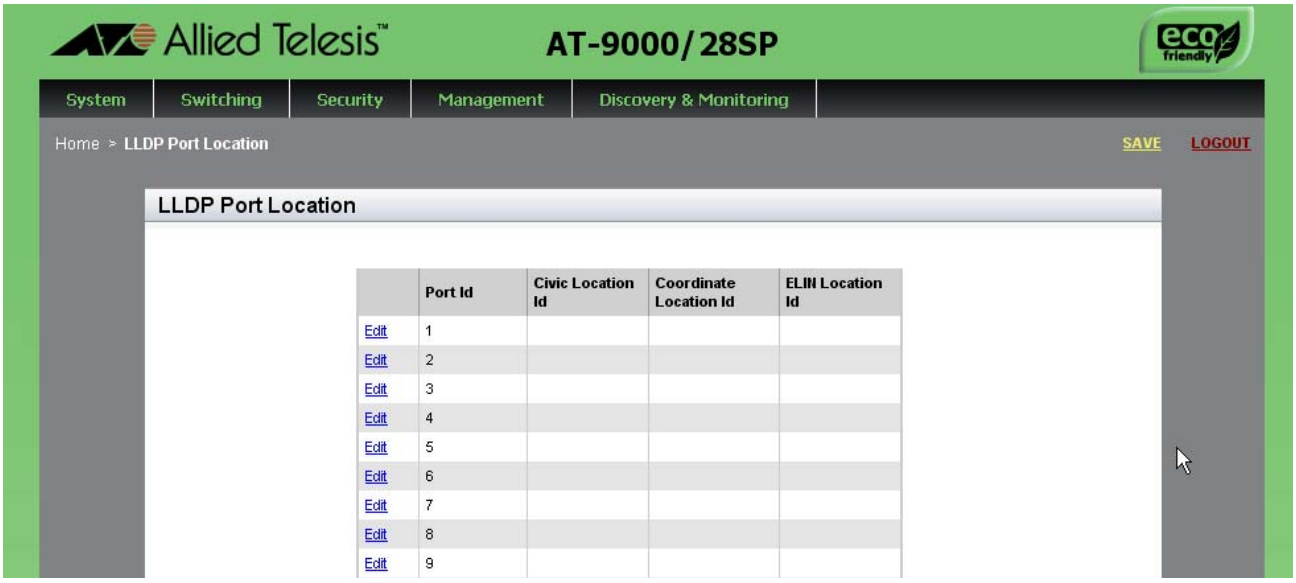


Figure 79. LLDP Port Location Page

The following fields are displayed.

- **Port Id**— Indicates the port number.
- **Civic Location ID**— Use the pull-down menu to add civic location information to the port. The specified location entry must already exist.
- **Coordinate Location ID**— Use the pull-down menu to add LLDP-MED coordinate information to the port. The specified location entry must already exist.
- **ELIN Location ID**— Use the pull-down menu to add ELIN location information to the port. The specified location entry must already exist.

4. Click **Edit** next to the port that you want to modify.

The Modify LLDP Port Location page is displayed. See Figure 80.

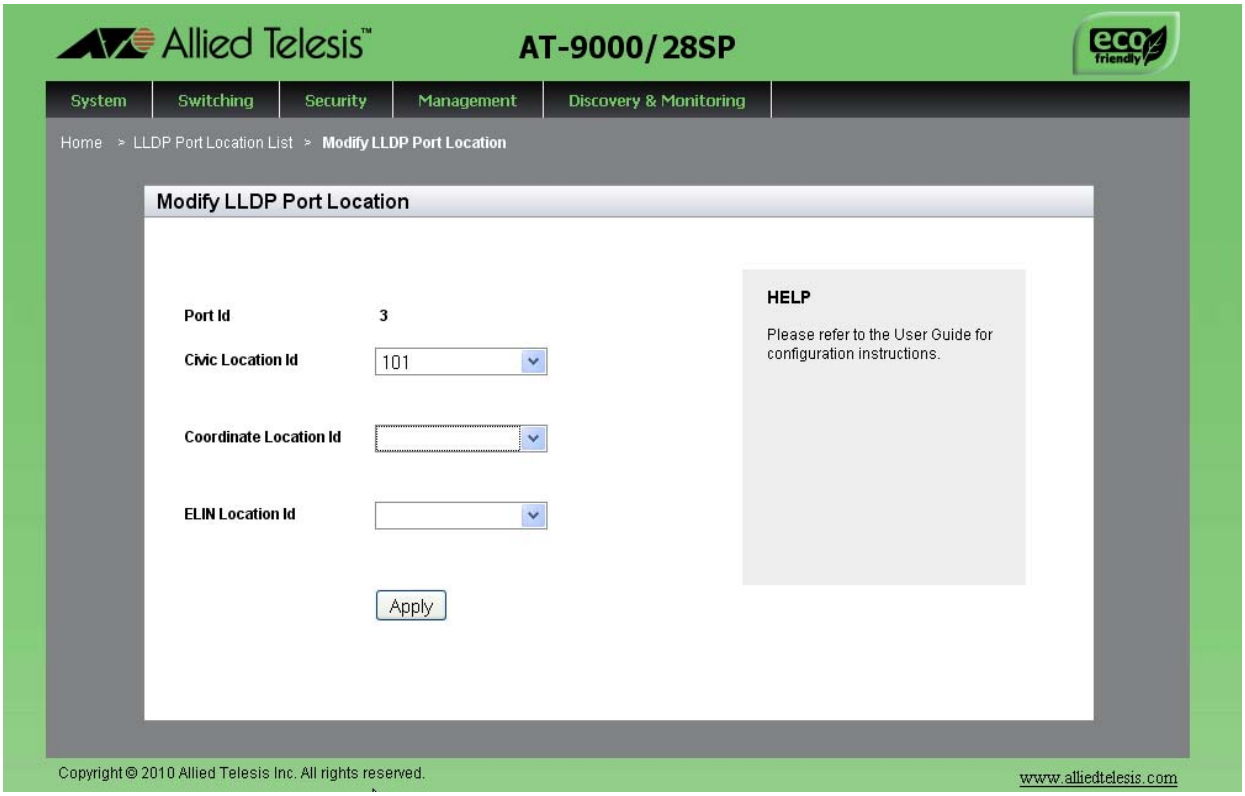


Figure 80. Modify LLDP Port Location Page

5. Change the fields as needed. Click on the box next to a field to select it.

   The definitions are listed in step 3.

6. Click **Apply**.

Enabling LLDP TLV

To enable LLDP TLV, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP.**

   The LLDP tab is displayed.

3. From the LLDP tab, select **TLV**.

The LLDP TLV tab is displayed in Figure 81.

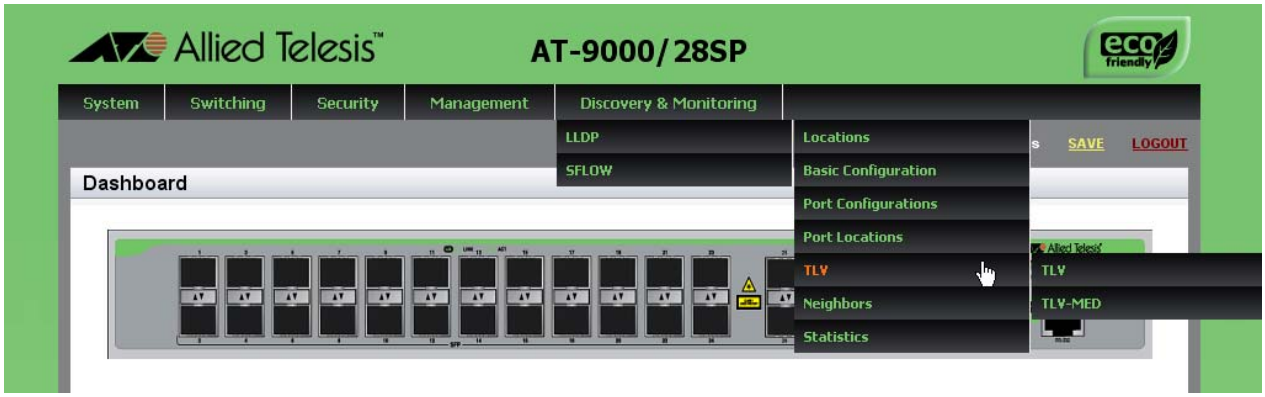


Figure 81. LLDP TLV Tab

4. Move your cursor to the right and select **TLV** again.

   The LLDP TLV page is displayed. See Figure 82.

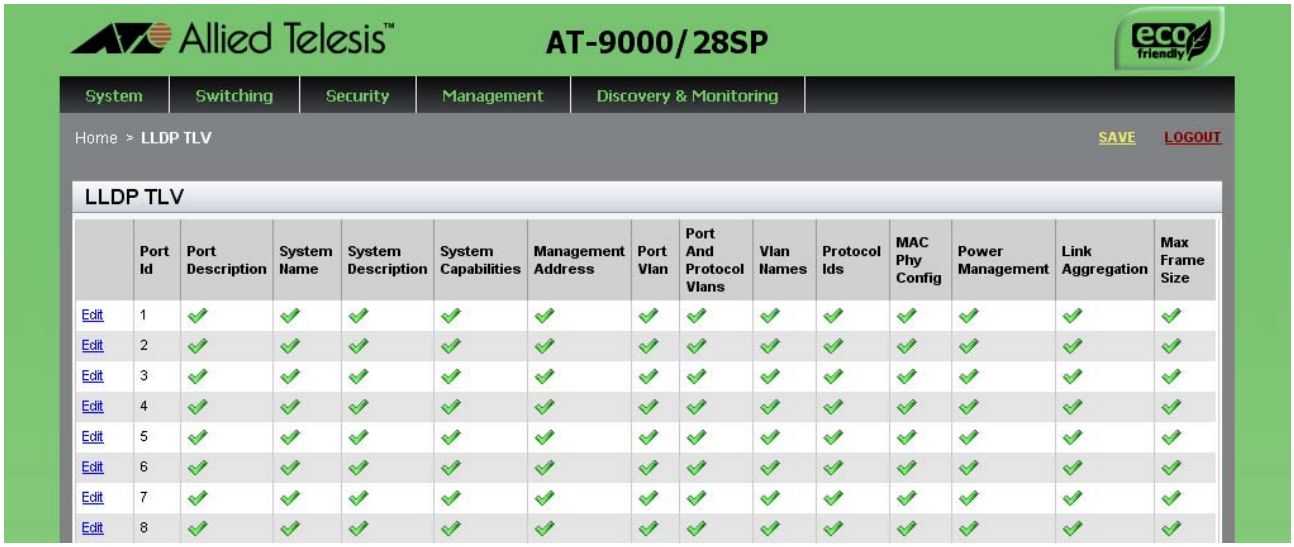


Figure 82. LLDP TLV Page

5. Click **Edit** next to the port that you want to modify.

The Modify LLDP TLV page is displayed. See Figure 83.

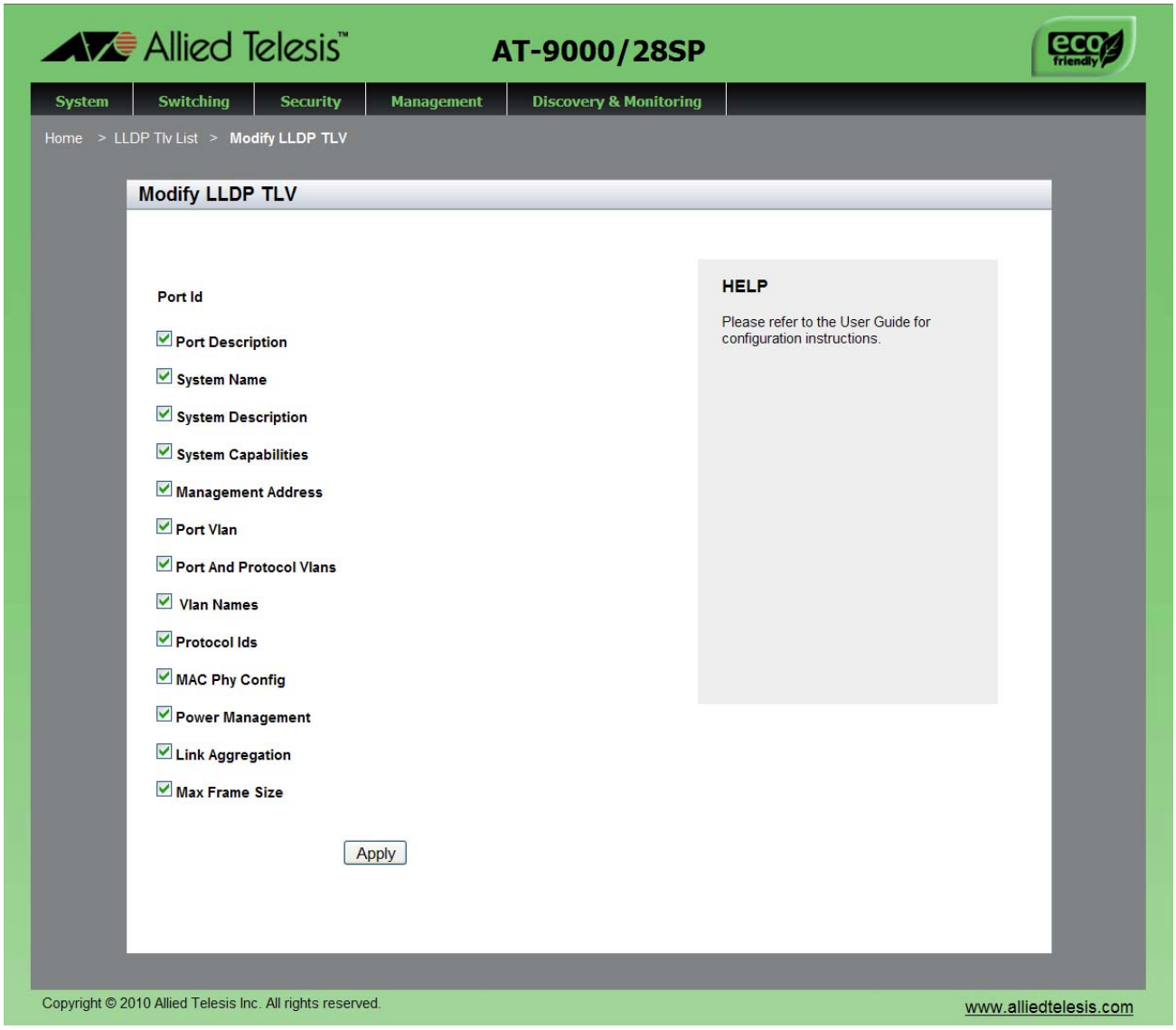


Figure 83. Modify LLDP TLV Page

6. Change the following fields as needed:

   - **Port Description**— Indicates the port description of the neighbor's port.
   - **System Name**— Indicates the neighbor's system name.
   - **System Description**— Provides the model number of the AT-9000 switch.
   - **System Capabilities**— Indicates the device's router and bridge functions, and whether or not these functions are currently enabled.

- **Management Address**— Indicates the IP address of the local LLDP agent. This is used to obtain information related to the local device.
- **Port Vlan**— Indicates the VID of the VLAN in which the transmitting port is an untagged member.
- **Port and Protocol Vlans**— Indicates whether the device supports protocol VLANs and, if it does, the protocol VLAN identifiers. This field is not supported on the AT-9000 switches.
- **Vlan Names**— Lists the names of the VLANs in which the transmitting port is either an untagged or tagged member.
- **Protocol Ids**— List of protocols that are accessible through the port, for instance:

  - 9000 (Loopback)
  - 0026424203000000 (STP, RSTP, or MSTP)
  - 888e01 (802.1x)
  - AAAA03 (EPSR)
  - 88090101 (LACP)
  - 00540000e302 (Loop protection)
  - 0800 (IPv4)
  - 0806 (ARP)
  - 86dd (IPv6)

- **MAC Phy Config**— Indicates the speed and duplex mode of the port and whether the port was configured with Auto-Negotiation.
- **Power Management**— Indicates the power via MDI capabilities of the port.
- **Link Aggregation**— Indicates whether the port is capable of link aggregation and, if so, whether it is currently a member of an aggregator.
- **Max Frame Size**— Sends the maximum supported frame size of the port. This field is not adjustable on the switch.

7. Click **Apply**.

Enabling LLDP-MED TLV

To enable LLDP-MED TLV, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP** and then select **TLV**.

   The LLDP TLV tab is displayed. See Figure 81 on page 217.

3. From the LLDP TLV tab, select **TLV-MED**.

   The LLDP MED TLV page is displayed. See Figure 84.

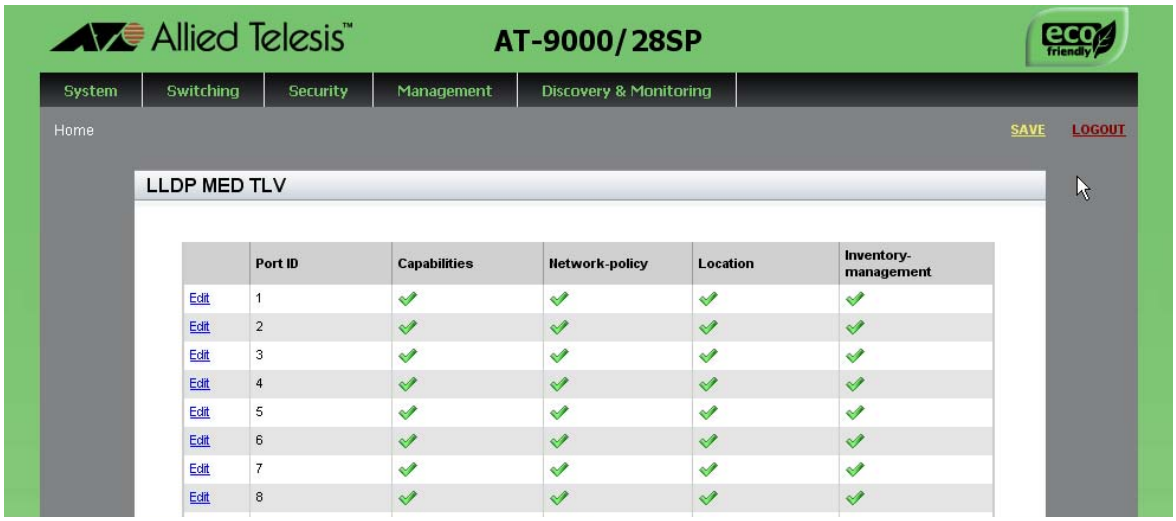


Figure 84. LLDP MED TLV Page

The following fields are displayed:

- **Port Id**— Indicates the port number.
- **Capabilities**— Indicates the device's router and bridge functions, and whether or not these functions are currently enabled.
- **Network-policy**— The network policy information configured on the port for connected media endpoint devices. The switch supports Application Type 1: Voice, including the following network policy for connected voice devices to use for voice data:

  - Voice VLAN ID
  - Voice VLAN Class of Service (CoS) priority
  - Voice VLAN Diffserv Code Point (DSCP)

- **Location**— Location information configured for the port, in one or more of the following formats:

  - Civic location
  - Coordinate location
  - Emergency Location Identification Number (ELIN)

- **Inventory-management**— The current hardware platform and the software version, identical on every port on the switch:

  - Hardware Revision
  - Firmware Revision
  - Software Revision
  - Serial Number
  - Manufacturer Name
  - Model Name
  - Asset ID

4. Click **Edit** next to the port that you want to modify.

   The Modify LLDP Med TLV page is displayed. See Figure 85.

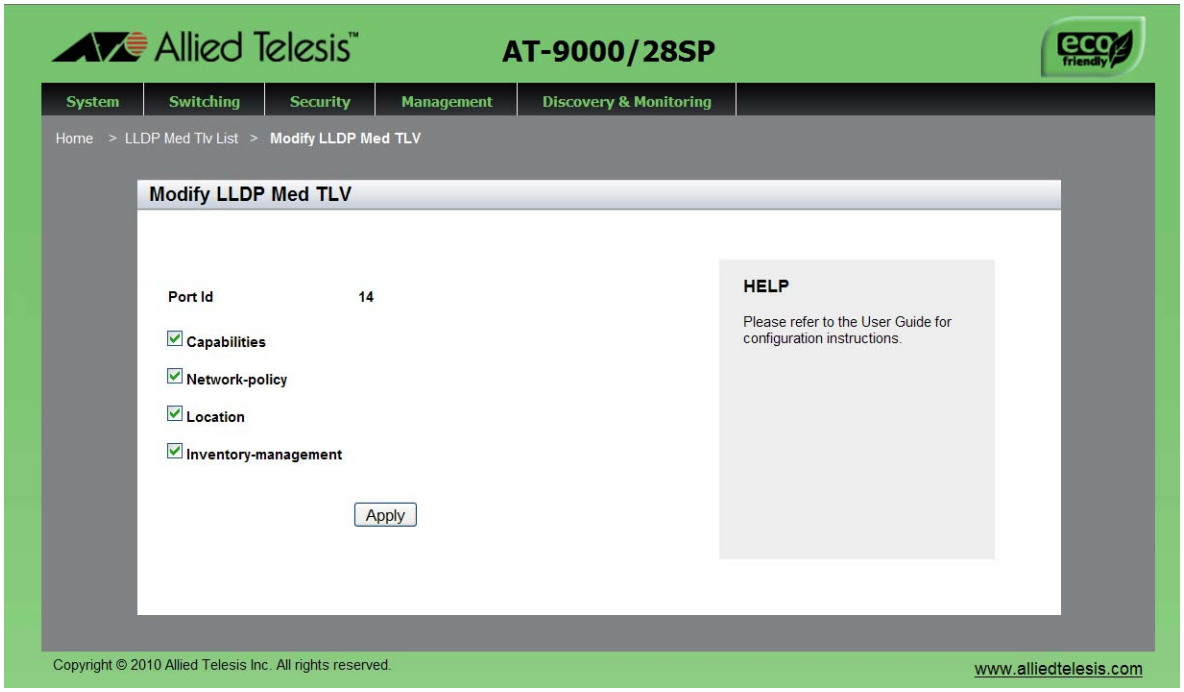


Figure 85. Modify LLDP Med TLV Page

5. Change the following fields as needed.
   - **Capabilities**— Specifies the capabilities TLV.
   - **Network-policy**— Specifies the network policy TLV.
   - **Location**— Specifies the location identification TLV.
   - **Inventory-management**— Specifies the inventory management TLV.
6. Click **Apply** to save your changes to the running-configuration file.

Displaying LLDP Neighbor Information

To display LLDP Statistical information, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP** and then select **Neighbors**.

   The LLDP Neighbors Information page is displayed. See Figure 86.

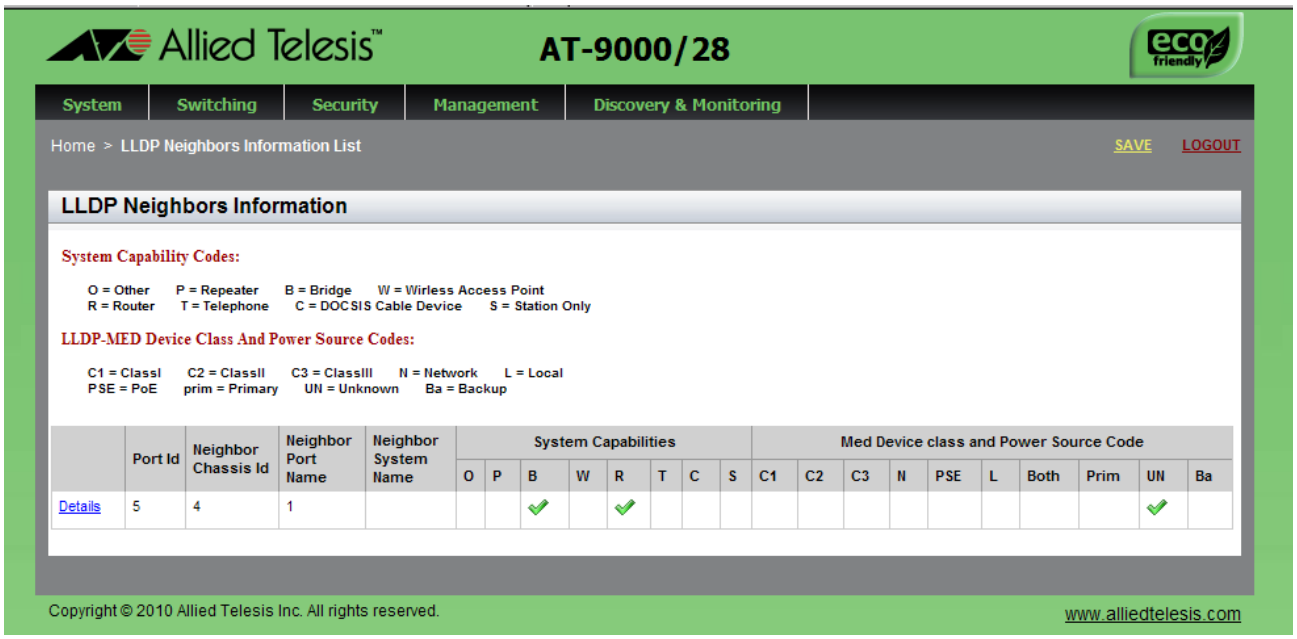


Figure 86. LLDP Neighbors Information Page

The following fields are displayed:

- **Port Id**— Indicates the port number.
- **Neighbor Chassis Id**— Specifies the ID number of the neighbor's chassis.
- **Neighbor Port Name**— Specifies the neighbor's port number that sent the information.
- **Neighbor System Name**— Indicates the neighbor's system name.

- **System Capabilities**— Capabilities that are supported and enabled on the neighbor. The System Capabilities codes are:

  O = Other

  P = Repeater

  B= Bridge

  W = Wireless Access Point

  R = Router

  T = Telephone

  C= Cable Device

  S = Station only

- **Med Device class and Power Source code**— The MED device Classes I through III are supported. Power Source code indicates the current power source which is either the Primary Power Source or the Backup Power Source. The codes are:

  C1 = Class I

  C2 = Class II

  C3 = Class III

  N = Network

  L = Local

  PSE = PoE

  prim = Primary

  UN = Unknown

  Ba = Backup

Displaying LLDP Statistics

To display LLDP Neighbor information, do the following:

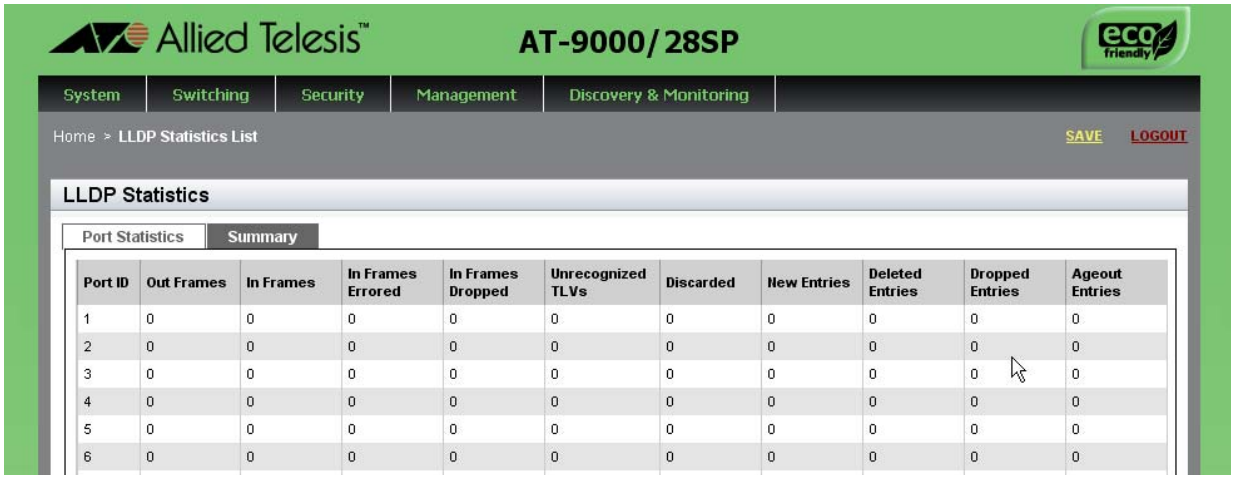
1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**

   From the LLDP tab, select **Statistics**.

   The LLDP Statistics page is displayed with the Port Statistics tab selected automatically. See Figure 87.



Port ID	Out Frames	In Frames	In Frames Errored	In Frames Dropped	Unrecognized TLVs	Discarded	New Entries	Deleted Entries	Dropped Entries	Ageout Entries
1	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0

Figure 87. LLDP Statistics Page with Port Statistics Tab

The following fields are displayed:

- **Port ID**— Indicates the port number.
- **Out Frames**— Lists the number of LLDPDU frames transmitted.
- **In Frames**— Lists the number of LLDPDU frames received.
- **In Frames Errored**— Lists the number of invalid LLDPDU frames received.
- **In Frames Dropped**— Lists the number of LLDPDU frames received and discarded.
- **Unrecognized TLVs**— Lists the number of LLDP TLVs received that were unrecognized, but the TLV types were in the range of reserved TLV types.
- **Discarded**— Indicates the number of discarded TLVs.

- **New Entries**— Indicates the number of times the information advertised by neighbors has been inserted into the neighbor table.
- **Deleted Entries**— Indicates the number of times the information advertised by neighbors has been removed from the neighbor table.
- **Dropped Entries**— Indicates the number of times the information advertised by neighbors could not be entered into the neighbor table because of insufficient resources.
- **Ageout Entries**— Indicates the number of times the information advertised by neighbors has been removed from the neighbor table because the information TTL interval has expired.

3. Select the **Summary** tab.

   The LLDP Statistics Summary page is displayed. See Figure 88.

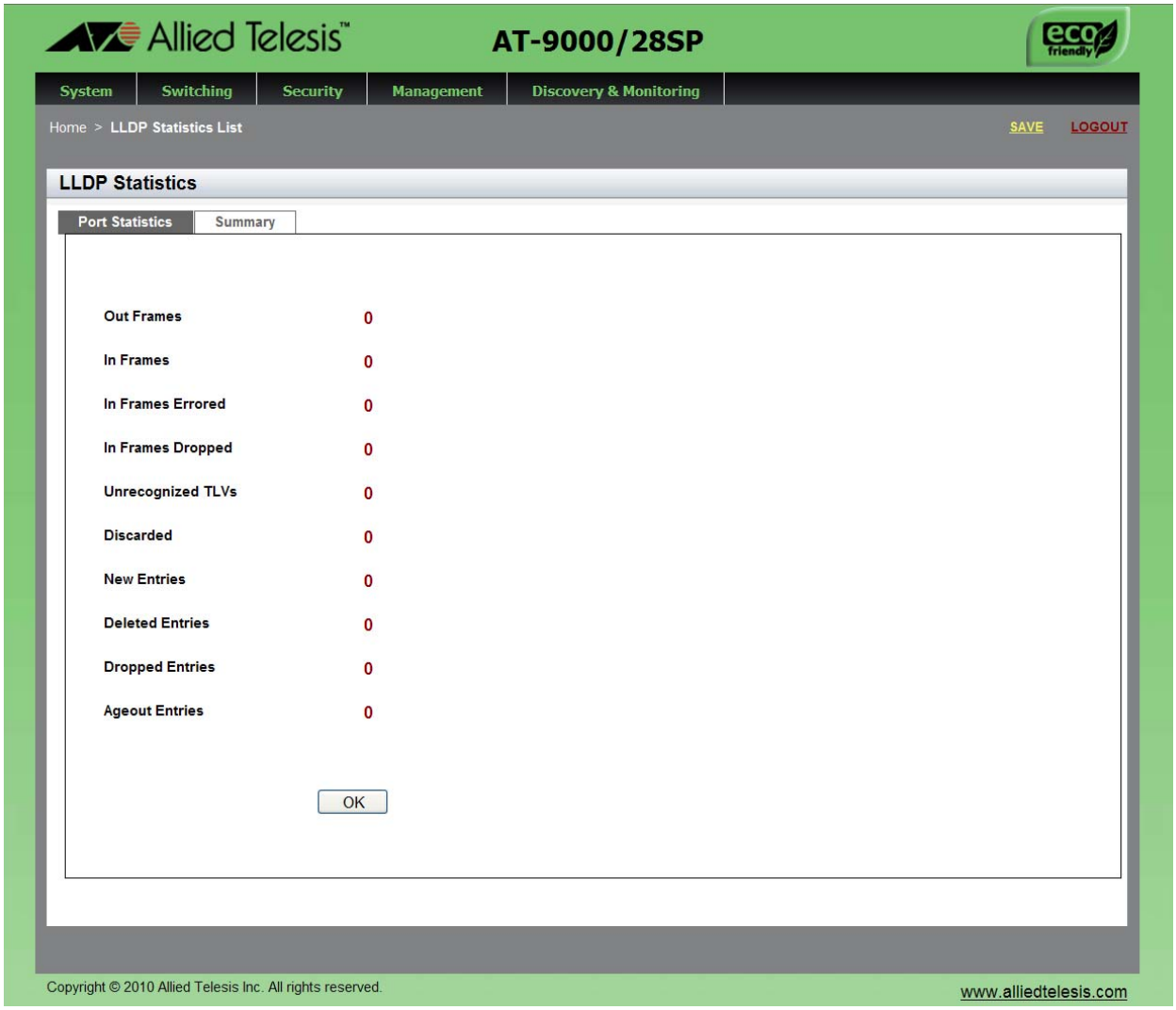


Figure 88. LLDP Statistics Page with Summary Tab

The fields are described in step 3. These fields list the statistics for all of the ports.

4. Click **OK** to return to the LLDP Statistics Page with the Port Statistics Tab selected.

Displaying LLDP Locations

To display the LLDP Civic, Coordinate, and ELIN locations, use the following procedures:

- “Displaying Civic Locations” on page 228
- “Displaying Coordinate Locations” on page 229
- “Displaying ELIN Locations” on page 230

For information about creating LLDP locations, see “Setting LLDP Locations” on page 201.

Displaying Civic Locations

To display a Civic Location, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab, select **Locations**.

   The Locations tab is displayed. See Figure 69 on page 202.

4. From the Locations tab, select **Civic**.

   The LLDP Civic Location page is displayed. See Figure 71 on page 204.

   The following fields are displayed:

   - **Id**
   - **Country**
   - **State**
   - **County**
   - **City**
   - **Division**
   - **Neighborhood**
   - **Street Group**
   - **Leading Street Direction**
   - **Trailing Street Suffix**
   - **Street Suffix**

- **House Number**
- **House Number Suffix**
- **Landmark**
- **Additional Information**
- **Name**
- **Postal Code**
- **Building**
- **Unit**
- **Floor**
- **Room**
- **Place Type**
- **Postal Community Name**
- **Post Office Box**
- **Additional Code**
- **Seat**
- **Primary Road Name**
- **Road Selection**
- **Branch Road Name**
- **Sub Branch Road Name**
- **Street Name Pre Modifier**
- **Street Name Pre Modifier**

Displaying Coordinate Locations

To display a Coordinate Location, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab, select **Locations**.

   The Locations tab is displayed. See Figure 69 on page 202.

4. From the Locations tab, select **Coordinates**.

   The LLDP Coordinate Location page is displayed. See Figure 73 on page 206.

The following fields are displayed:

- **Id**— Specifies the LLDP Coordinate Location ID.
- **Latitude**— Indicates the latitude value in decimal degrees. The range is -90.0º to 90.0º. The field accepts up to two digits to the right of the decimal point.
- **Latitude Resolution**— Indicates the latitude resolution as the number of valid bits. The range is 0 to 34 bits.
- **Longitude**— Specifies the longitude value in decimal degrees. The range is -180.0º to 180.0º. The field accepts up to two digits to the right of the decimal point.
- **Longitude Resolution**— Specifies the longitude resolution as the number of valid bits. The range is 0 to 34 bits.
- **Altitude**— Specifies the altitude in meters or floors. For the altitude in meters, the range is -2097151.0 to 2097151.0 meters. The parameter accepts up to eight digits to the right of the decimal point. For altitude in the number of floors, the range is -2097151.0 to 2097151.0. Use the Altitude Type field to specify meters or floors.
- **Altitude Resolution**— Indicates the altitude resolution as the number of valid bits. The range is 0 to 30 bits.
- **Datum**— The geodetic system (or datum) of the coordinates. Choose one of the following:

nad83-mllw	Mean lower low water datum 1983
nad83-navd	North American vertical datum 1983
wgs84	World Geodetic System 1984

Displaying ELIN Locations

To display an LLDP ELIN location, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab, select **Locations**.

   The Locations tab is displayed. See Figure 69 on page 202.

4. From the Location tab, select **ELIN**.

   The LLDP ELIN Location page is displayed. See Figure 75 on page 208.

The following fields are displayed:

- **Id**— Specifies an ID number for a LLDP-MED coordinate location entry on the switch. The range is 1 to 256. (This range is same as the ranges for civic and coordinate entries.) You can specify one ID number.
- **Elin Id**— Specifies the ELIN of 10 to 25 digits.

Displaying LLDP and LLDP-MED Settings

To display the LLDP Civic, Coordinate, and ELIN locations, use the following procedures:

- “Displaying the Basic LLDP Configuration” on page 232
- “Displaying LLDP Port Assignments” on page 233
- “Displaying Port Locations” on page 234
- “Displaying LLDP TLV” on page 234
- “Displaying LLDP-MED TLV” on page 236

For information about configuring LLDP and LLDP-MED, see “Configuring LLDP and LLDP-MED” on page 210

Displaying the Basic LLDP Configuration

To display the basic LLDP configuration, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears to the right.

3. From the LLDP tab, select the **Basic Configuration** tab.

   The LLDP Configuration page is displayed. See Figure 76 on page 211.

   The following fields are displayed:

   - **Status**— Indicates whether LLDP is enabled or disabled on the switch. By default, LLDP is disabled on the switch.
   - **Timer**— Specifies the transmit interval. The range is 5 to 32,768 seconds.
   - **Fast Start Count**— Indicates the fast start count for LLDP-MED. The fast start count determines how many fast start advertisements LLDP sends from a port when it begins sending LLDP-MED advertisements from a port, for instance when it detects a new LLDP-MED capable device. The default value is 3.
   - **Holdtime Multiplier**— Sets the holdtime multiplier value. The transmit interval is multiplied by the holdtime multiplier to give the Time To Live (TTL) the switch advertises to the neighbors. The range is 2 to 10.
   - **Non Strict Med TLV Order Check**— Sets the switch to accept LLDP-MED advertisements even if the TLVs are not in the

standard order, as specified in ANSI/TIA-1057. This configuration is useful if the switch is connected to devices that send LLDP-MED advertisements in which the TLVs are not in the standard order. Click in the box next to this field to select the nonstrict Med TLV Order Check.

- **Notification Interval**— Sets the notification interval. This is the minimum interval between LLDP SNMP notifications (traps). The range is 5 to 3600 seconds.
- **Reinit**— Sets the reinitialization delay. This is the number of seconds that must elapse after LLDP is disabled on a port before it can be reinitialized. The range is 1 to 10 seconds.
- **Tx Delay**— Specifies the transmission delay. This is the minimum time interval between transmissions of advertisements due to changes in LLDP local information.
- **Total Neighbors**— Indicates the number of LLDP neighbors the switch has discovered on all its ports. You cannot modify this field.
- **Neighbors Last Update**— Indicates the time since the LLDP neighbor table was last updated. You cannot modify this field.

Displaying LLDP Port Assignments

To display LLDP port assignments, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP** and then select **Port Configurations**.

   The LLDP Port Config page is displayed. See Figure 77 on page 213.

   The following fields are displayed:

   - **Port Id**— Indicates the port number.
   - **Notification**— Configures the switch to send LLDP-MED topology change notifications when devices are connected to or disconnected from the specified ports. By default, this field is not selected.
   - **Adv. Transmit**— Configures ports to send LLDP advertisements. Ports configured to transmit LLDP advertisements send the mandatory TLVs and any optional LLDP TLVs they have been configured to send. By default, this field is selected.
   - **Adv. Receive**— Configures ports to accept LLDP advertisements. Ports configured to receive LLDP advertisements accept all advertisements from their neighbors. By default, this field is selected.

- **Med Notification**— Indicates the switch sends LLDP-MED topology change notifications when devices are connected to or disconnected from the specified ports. By default, this field is not selected.

Displaying Port Locations

To display the LLDP port locations, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears on the right.

3. From the LLDP tab**,** select **Port Locations**.

   The LLDP Port Location page is displayed. See Figure 79 on page 215.

   The following fields are displayed.

   - **Port Id**— Indicates the port number.
   - **Civic Location ID**— Use the pull-down menu to add civic location information to the port. The specified location entry must already exist.
   - **Coordinate Location ID**— Use the pull-down menu to add LLDP-MED coordinate information to the port. The specified location entry must already exist.
   - **ELIN Location ID**— Use the pull-down menu to add ELIN location information to the port. The specified location entry must already exist.

Displaying LLDP TLV

To display the LLDP TLV settings, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP.**

   The LLDP tab is displayed.

3. From the LLDP tab, select **TLV**.

   The LLDP TLV tab is displayed in Figure 81 on page 217.

4. From the LLDP TLV tab, select **TLV** again.

   The LLDP TLV page is displayed. See Figure 82 on page 217.

   The following fields are displayed:

   - **Port Id**— Indicates the port number.
   - **Port Description**— Indicates the port description of the neighbor's port.
   - **System Name**— Indicates the neighbor's system name.
   - **System Description**— Provides the model number of the AT-9000 switch.
   - **System Capabilities**— Indicates the device's router and bridge functions, and whether or not these functions are currently enabled.
   - **Management Address**— Indicates the IP address of the local LLDP agent. This is used to obtain information related to the local device.
   - **Port Vlan**— Indicates the VID of the VLAN in which the transmitting port is an untagged member.
   - **Port and Protocol Vlans**— Indicates whether the device supports protocol VLANs and, if it does, the protocol VLAN identifiers. This field is not supported on the AT-9000 switches.
   - **Vlan Names**— Lists the names of the VLANs in which the transmitting port is either an untagged or tagged member.
   - **Protocol Ids**— List of protocols that are accessible through the port, for instance:

     - 9000 (Loopback)

     - 0026424203000000 (STP, RSTP, or MSTP)

     - 888e01 (802.1x)

     - AAAA03 (EPSR)

     - 88090101 (LACP)

     - 00540000e302 (Loop protection)

     - 0800 (IPv4)

     - 0806 (ARP)

     - 86dd (IPv6)

   - **MAC Phy Config**— Indicates the speed and duplex mode of the port and whether the port was configured with Auto-Negotiation

- **Power Management**— Indicates the power via MDI capabilities of the port.
- **Link Aggregation**— Indicates whether the port is capable of link aggregation and, if so, whether it is currently a member of an aggregator.
- **Max Frame Size**— Sends the maximum supported frame size of the port. This field is not adjustable on the switch.

Displaying LLDP-MED TLV

To display LLDP-MED TLV settings, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP** and then select **TLV**.

   The LLDP TLV tab is displayed. See Figure 81 on page 217.

3. From the LLDP TLV tab, select **TLV-MED**.

   The LLDP Med TLV page is displayed. See Figure 84 on page 220.

   The following fields are displayed:

   - **Port Id**— Indicates the port number.
   - **Capabilities**— Indicates the device's router and bridge functions, and whether or not these functions are currently enabled.
   - **Network-policy**— The network policy information configured on the port for connected media endpoint devices. The switch supports Application Type 1: Voice, including the following network policy for connected voice devices to use for voice data:

     - Voice VLAN ID
     - Voice VLAN Class of Service (CoS) priority
     - Voice VLAN Diffserv Code Point (DSCP)

   - **Location**— Location information configured for the port, in one or more of the following formats:

     - Civic location
     - Coordinate location
     - Emergency Location Identification Number (ELIN)

- **Inventory-management**— The current hardware platform and the software version, identical on every port on the switch:

  - Hardware Revision
  - Firmware Revision
  - Software Revision
  - Serial Number
  - Manufacturer Name
  - Model Name
  - Asset ID

Disabling LLDP on the Switch

To disable the LLDP feature on a switch, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 68 on page 201.

2. From the **Discovery & Monitoring** tab, select **LLDP**.

   The LLDP tab appears to the right.

3. From the LLDP tab, select the **Basic Configuration** tab.

   The LLDP Configuration page is displayed. See Figure 76 on page 211.

4. Use the pull-down menu next to the **Status** field to select “Disabled.”

5. Click **Apply**.

Chapter 19

Setting sFlow

This chapter provides a brief description of the sFlow feature and explains how to enable this feature on the switch and on a port.

See the following sections:

- “Overview” on page 240
- “Enabling sFlow on the Switch” on page 242
- “Configuring sFlow on a Port” on page 243
- “Specifying an sFlow Collector” on page 245
- “Displaying the sFlow Settings” on page 247

For more information about the sFlow feature, see the following chapters in the *AlliedWare Plus Management Software Command Line Interface User’s Guide*:

- Chapter 55: sFlow Agent
- Chapter 56: sFlow Agent Commands

Overview

The sFlow agent allows the switch to gather data about the traffic on the ports and to send the data to sFlow collectors on your network for analysis. You can use the information to monitor the performance of your network or identify traffic bottlenecks.

The sFlow agent can gather two types of information about the traffic on the ports of the switch:

- ❒ Ingress packet samples
- ❒ Packet counters

Ingress Packet Samples

The sFlow agent can capture ingress packets on ports and send copies of the packets to sFlow collectors on your network for analysis. Depending on the capabilities of the collectors, packets can be scrutinized for source and destination MAC or IP addresses, protocol type, length, and so forth.

Packet sampling is activated by specifying sampling rates on the ports. This value defines the number of ingress packets from which the agent samples one packet. For example, a sampling rate of 1000 on a port prompts the agent to send one packet from every 1000 ingress packets to the designated sFlow collector. Different ports can have different rates.

Packet Counters

The agent can also gather and send data to a collector about overall information regarding the status and performance of the ports, such as speeds and status, and the statistics from the packet counters. The counters contain the number and types of ingress and egress packets handled by the ports since the switch or the counters were last reset. The agent can gather and send the following port status and counter information to a collector on your network:

- ❒ Port number
- ❒ Port type
- ❒ Speed
- ❒ Direction
- ❒ Status
- ❒ Number of ingress and egress octets
- ❒ Number of ingress and egress unicast packets
- ❒ Number of ingress and egress multicast packets
- ❒ Number of ingress and egress broadcast packets
- ❒ Number of ingress and egress discarded packets
- ❒ Number of ingress and egress packets with errors
- ❒ Number of ingress packets with unknown protocols

To configure the agent to forward these port statistics to the collectors, you have to specify polling rates, which define the maximum amount of time permitted between successive queries of the counters of a port by the agent.

Different ports can have different polling rates. Ports to which critical network devices are connected can be assigned low polling rates, so that the information on the collector is kept up-to-date. Ports connected to less critical devices can be assigned higher polling rates.

To increase its efficiency, the agent can send port status and counter information before the polling interval of a port times out. For example, if you define a polling interval of five minutes for a port, the agent, depending on its internal dynamics, may send the information to the collector before five minutes have actually elapsed.

sFlow Collectors

The sFlow agent on the switch can send port performance data to up to an sFlow collector on your network. The performance data from each port can be sent to one collector.

Guidelines

Here are the guidelines for the sFlow agent:

- The sFlow agent can send port performance data to up to four sFlow collectors on your network.
- The switch must have a management IP address. For instructions, refer to Chapter 17, "Setting IPv4 and IPv6 Management" on page 187.
- The sFlow collectors must be members of the same subnet as the management IP address of the switch, or must have access to it through routers or other Layer 3 devices.
- If the sFlow collectors are not a member of the same subnet as the management IP address of the switch, the switch must have a default gateway that specifies the first hop to reaching the collectors' subnet. For instructions, refer to Chapter 17, "Setting IPv4 and IPv6 Management" on page 187.
- The sFlow feature is not dependent on SNMP. You do not have to enable or configure SNMP on the switch to use the sFlow feature. In addition, you cannot use sFlow collectors to configure or manage SNMP.

Enabling sFlow on the Switch

To enable the sFlow feature on a switch, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 89 on page 242.

2. From the **Discovery & Monitoring** tab, select **sFlow**.

   The sFlow page is displayed with the Port Configurations tab selected. See Figure 89.

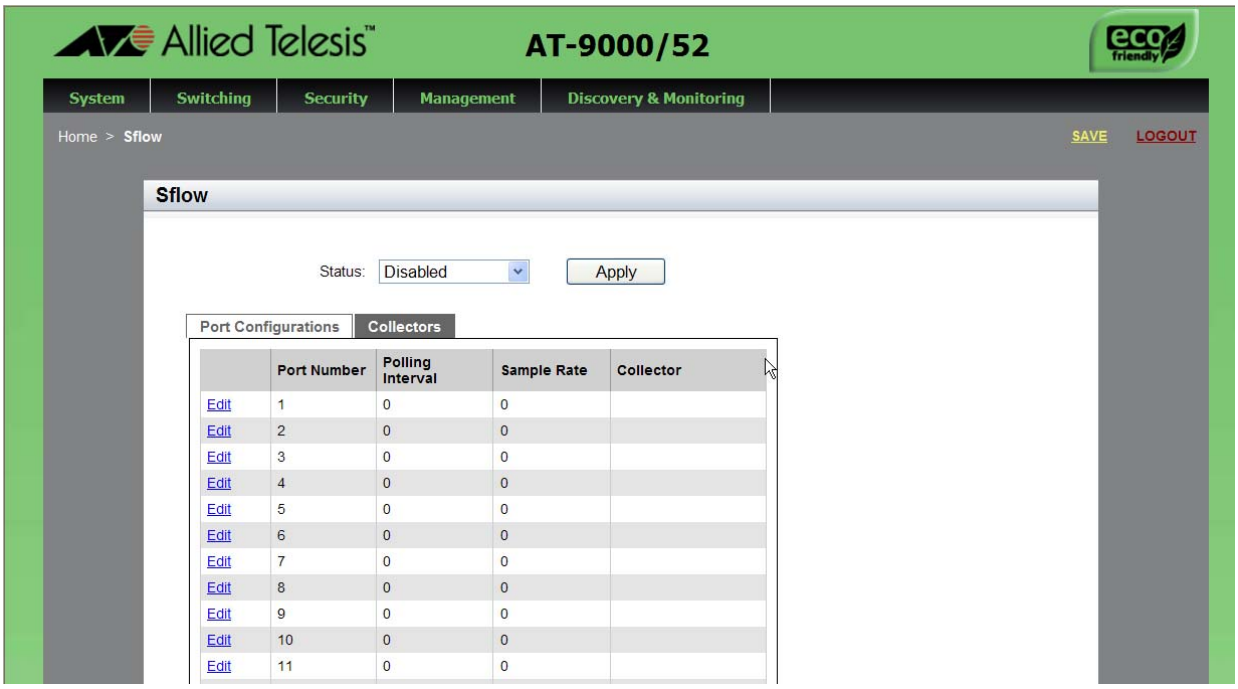


Figure 89. sFlow Page with the Port Configurations Tab

3. Use the pull-down menu next to the **Status** field to select “Enabled.”
4. Click **Apply**.

Configuring sFlow on a Port

To configure the sFlow feature on a port, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 89 on page 242.

2. From the **Discovery & Monitoring** tab, select **sFlow**.

   The sFlow page is displayed with the Port Configurations tab selected. See Figure 89 on page 242.

3. Click Edit next to the port that you want to modify.

   The sFlow Port Modify page is displayed. See Figure 90.

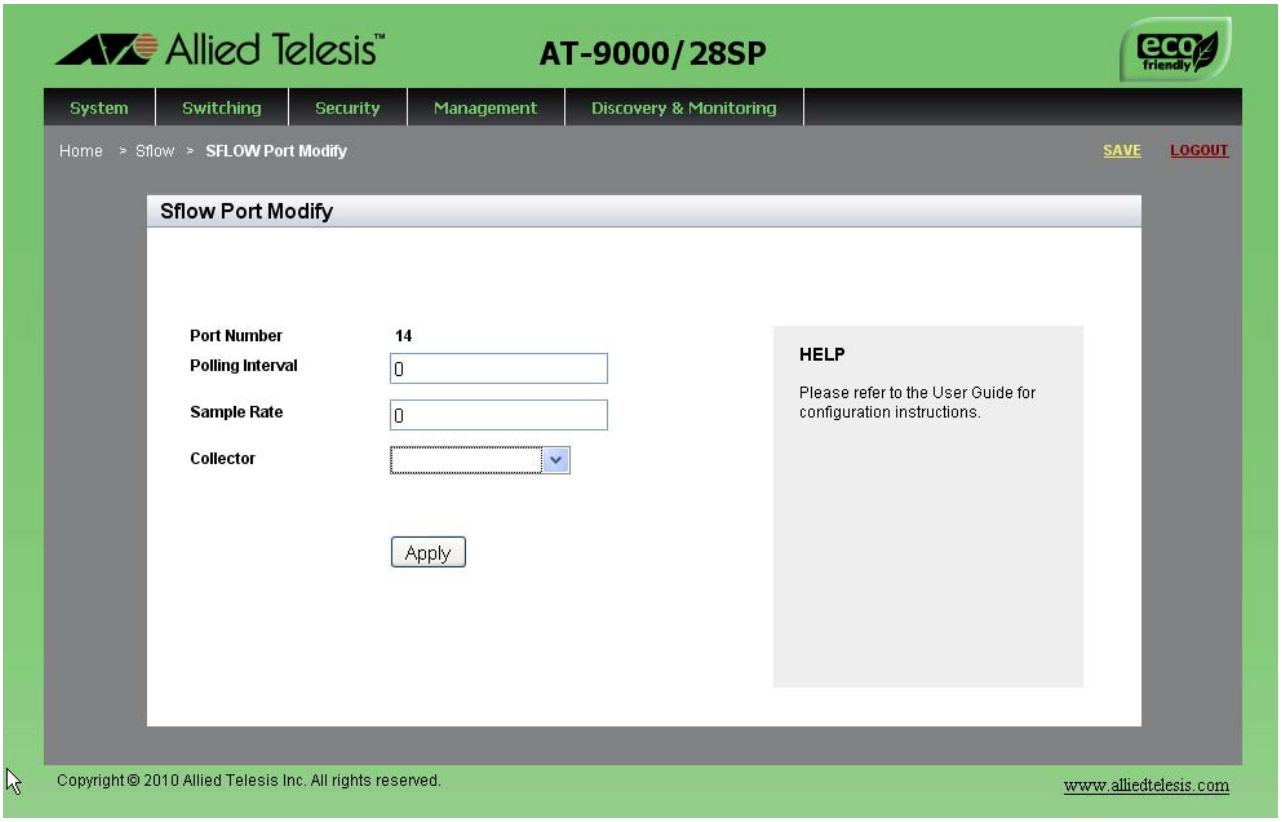


Figure 90. sFlow Port Modify Page

4. Change the following fields as needed:

   - **Port Number**— Indicates the port number.
   - **Polling Interval**— Sets the polling intervals for the ports. This controls the maximum amount of time permitted between successive pollings of the packet counters on the ports by the sFlow agent. The ports can have different polling intervals.
   - **Sample Rate**— Enables packet sampling on the ports and sets the sampling rates. The sampling rate dictates the number of ingress packets from which one sample is taken on a port and sent by the agent to the sFlow collector. For example, a sample rate of 700 on a port means that one sample packet is taken for every 700 ingress packets. The ports can have different sampling rates.
   - **Collector**— Number of sFlow collectors that have been defined on the switch by entering their IP addresses in the agent. The agent can contain up to four IP addresses of sFlow collectors. Enter the IP addresses in the “Specifying an sFlow Collector” on page 245.

5. Click **Apply**.

Specifying an sFlow Collector

Use this procedure to specify the IP addresses and the UDP ports of the sFlow collectors on your network. The packet sampling data and the packet counters are sent by the switch to the collectors specified. You can specify up to four collectors, but you can add only one address at a time with this procedure.

To select the Collect tab from the Sflow page, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 89 on page 242.

2. From the **Discovery & Monitoring** tab, select **sFlow**.

   The Sflow page is displayed with the Port Configurations tab selected. See Figure 89 on page 242.

3. From the sFlow page, select the **Collectors** tab.

   The Sflow page is displayed with the Collectors Tab selected. See Figure 91.

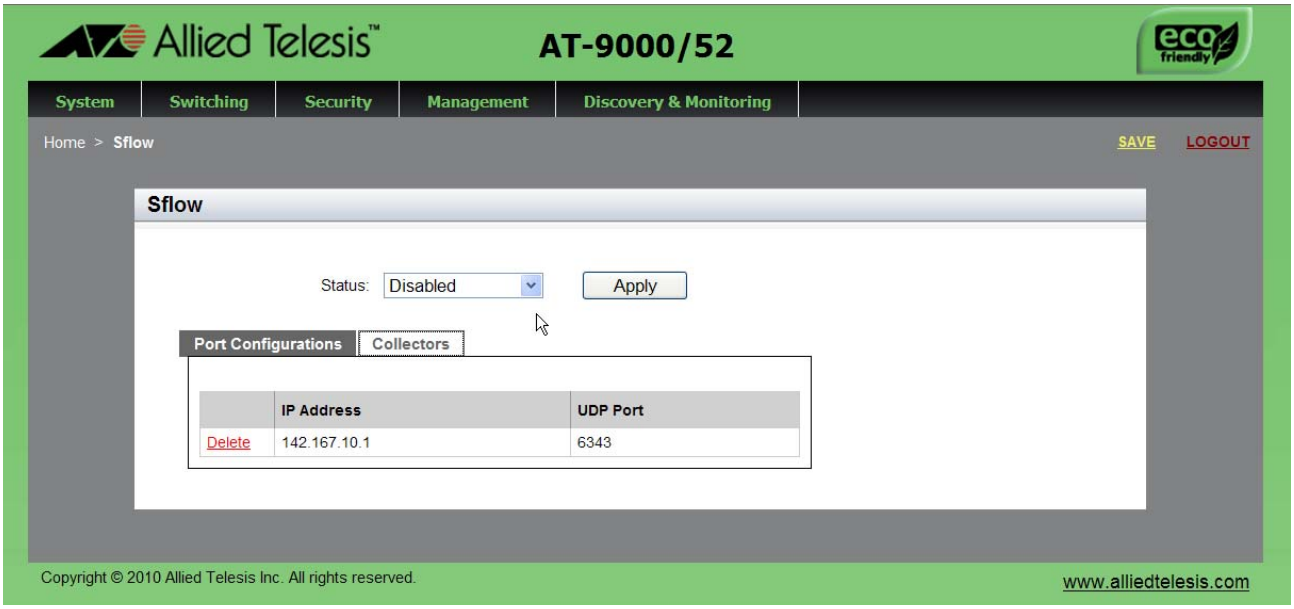


Figure 91. Sflow Page with Collectors Tab

4. Click **Add**.

The Sflow Collector page is displayed. See Figure 92.

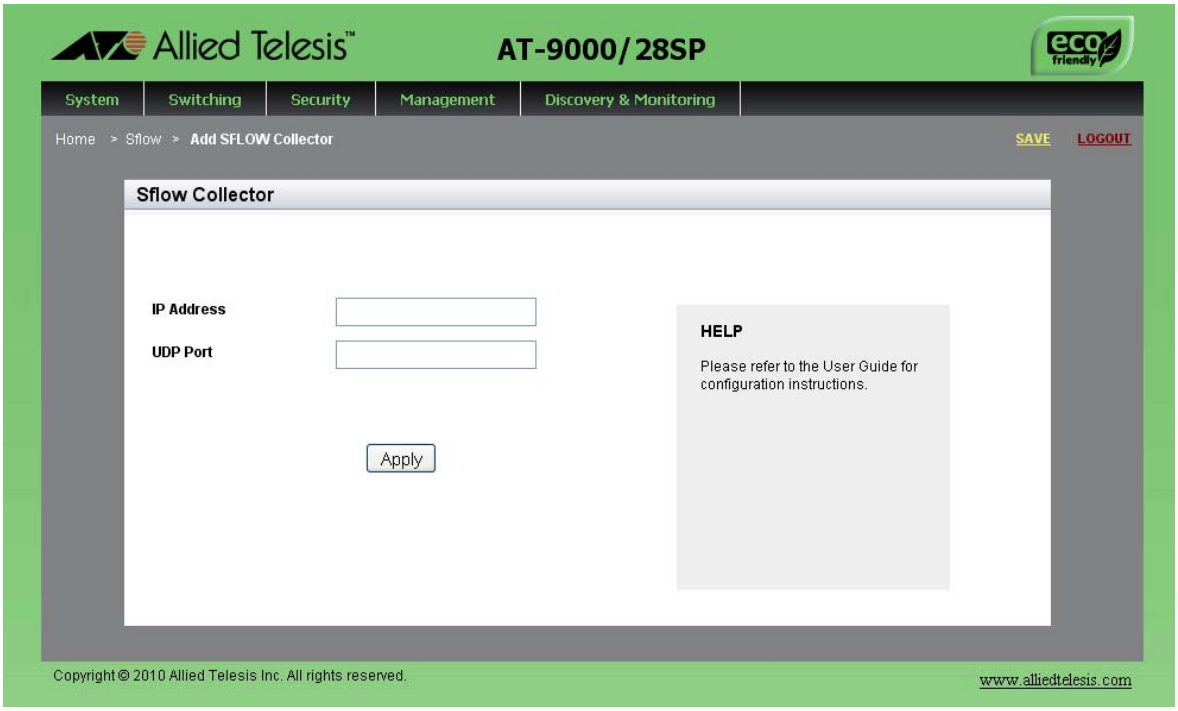


Figure 92. Sflow Collector Page

5. Change the following fields as needed:

   - **IP Address**— Specifies the IPv4 address of the sFlow collector on your network. Enter the IPv4 address in the following format:

     xxx.xxx.xxx.xxx

     where x is a number from 0 to 255. There are four groups of numbers that are separated by periods.

   - **UDP Port**— Specifies the UDP port number of the sFlow collector. The default is UDP port 6343.

6. Click **Apply**.

Displaying the sFlow Settings

To display the sFlow settings, do the following:

1. Select the **Discovery & Monitoring** tab.

   The **Discovery & Monitoring** tab is displayed. See Figure 89 on page 242.

2. From the **Discovery & Monitoring** tab, select **sFlow**.

   The sFlow page is displayed with the Port Configurations tab selected. See Figure 89 on page 242.

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